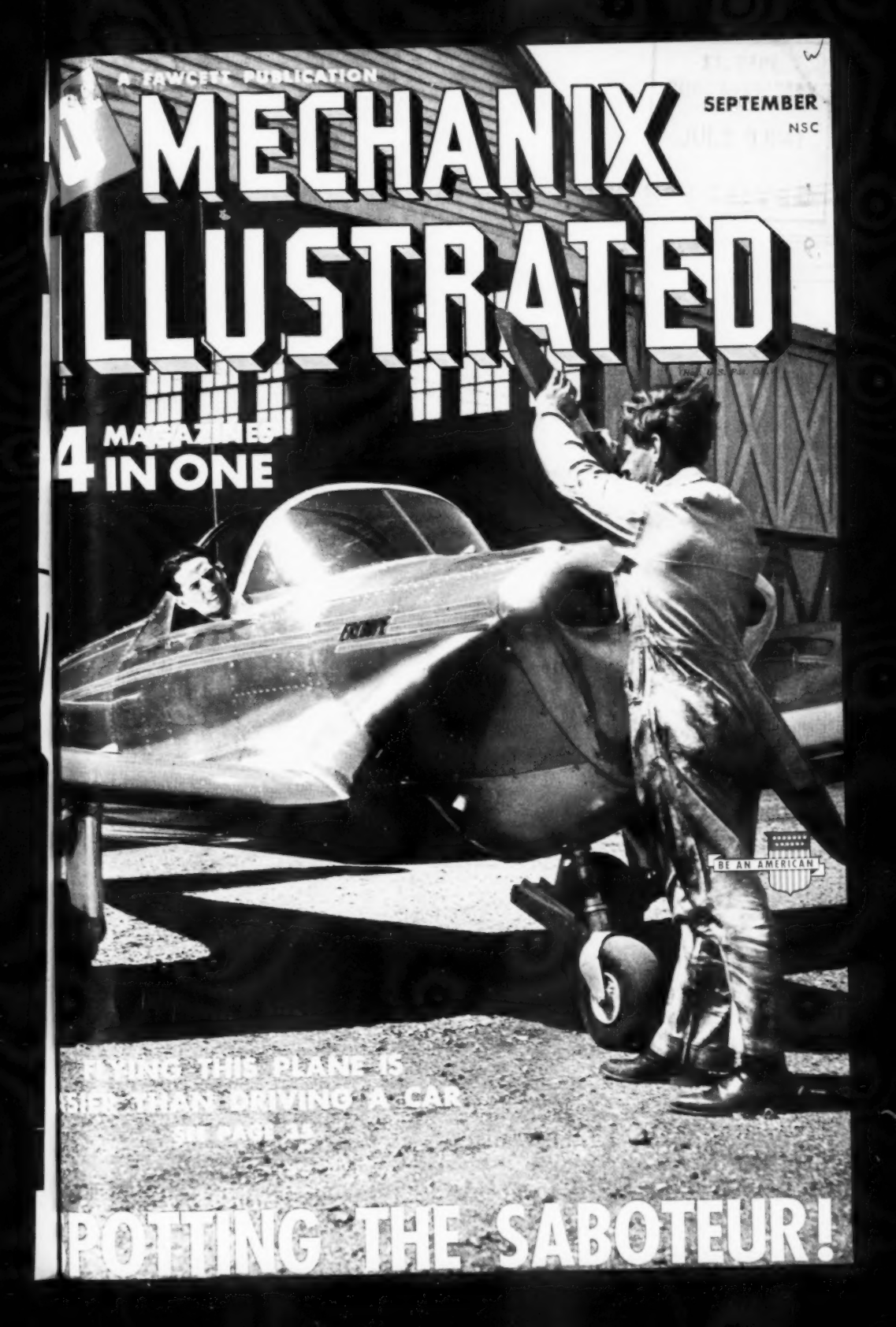
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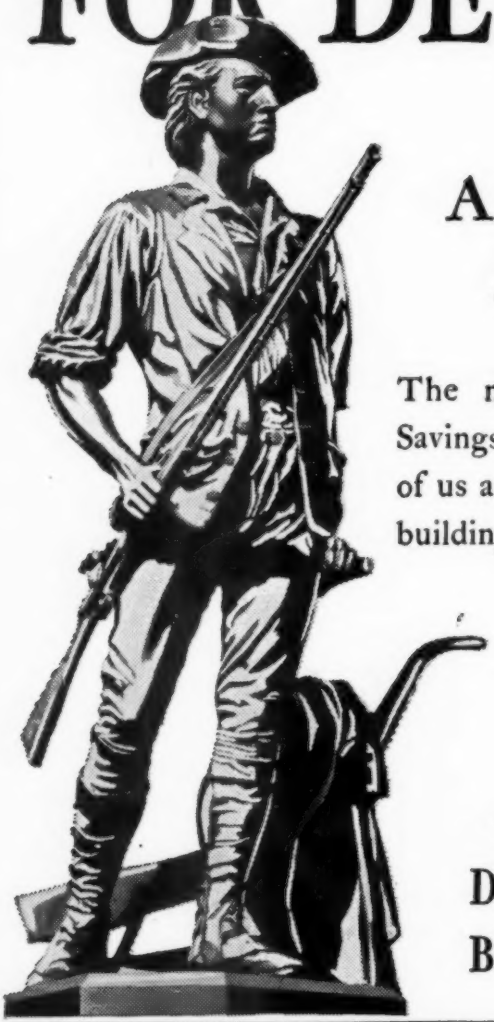

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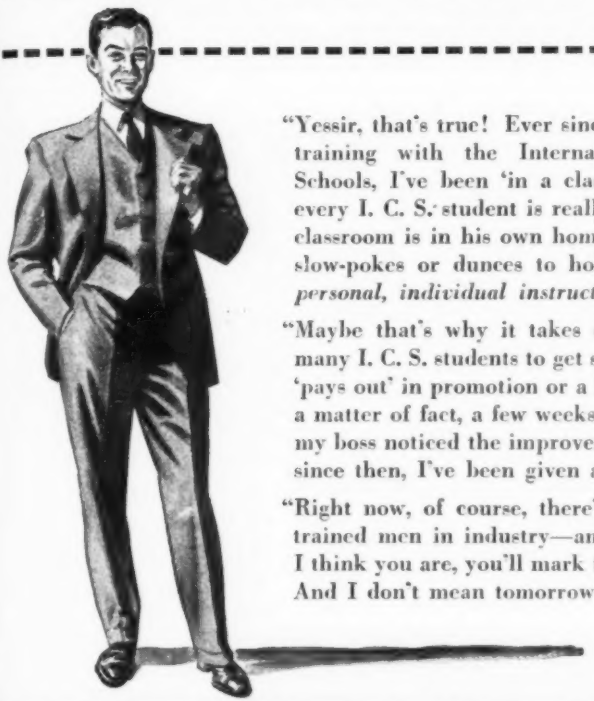

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SEPTEMBER
1941

Volume XXVI
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MAXWELL HAMILTON

Maxw
Hamilton, w
exciting
amazing ar
"I Flew My F
Time Up!"
pears in this is
is well known
MECHAN
ILLUSTRAT
readers throu
number of
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have appeare
this magazi
pages from
to time.

Mr. Hamilt
a graduate of Y
University, h
had many ye
of experience in the newspaper and ma
zine business, having been a columnist
The Brooklyn *Eagle*, reporter and fea
writer for The New York *American* and
New York *Evening Journal*, where he w
also assistant drama editor.

Mr. Hamilton says he cannot understa
never having been in an airplane bef
his first unique trip aloft.

They fly nearly eight miles abo
the earth, in the cold, blue voids
the sky where the mercury is
below zero. Their snarling plan
seek out the high-flying invadi
bombers who skim invisibly ov
great cities to drop their burdens
death, unseen. They are the newe
the most romantic, the most dar
devil—and the least known—arm
the Aviation Command: The Strat
sphere Patrol!

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by the patrol is the "blackout," th
bloody unconsciousness into whi
a pilot is thrown as he pulls out o
howling power dive. Scientists
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working on the puzzle secret
Don't fail to read Bill Kimball
thrilling and scientifically amazi
story on it in the October M
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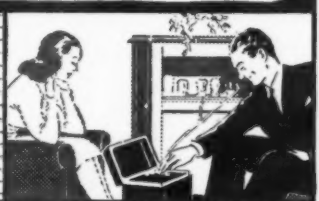

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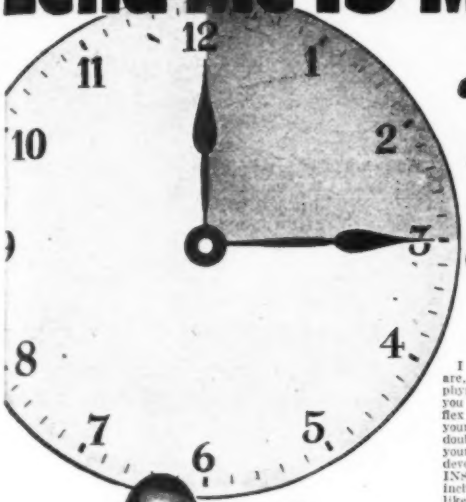
..and I'll prove I can make you a NEW MAN



I'M "trading-in" old bodies for new! I'm taking men who know that the condition of their arms, shoulders, chests and legs—their strength, "wind," and endurance—is not 100%. And I'm making NEW MEN of them.

I don't care how old or young you are, or how ashamed of your present physical condition you may be. If you can simply raise your arm and flex it I can add SOLID MUSCLE to your biceps—yes, on each arm—in double-quick time! I can broaden your shoulders, strengthen your back, develop your whole muscular system INSIDE and OUTSIDE! I can add inches to your chest, give you a vise-like grip, make those legs of yours lithe and powerful. I can shoot new strength into your old backbone, exercise those inner organs, help you cram your body so full of pep, vigor and red-blooded vitality that you won't feel there's even "standing room" left for weakness and that lazy feeling! Before I get through with you I'll have your whole frame "measured" to a nice, new, beautiful suit of muscle!

Here's What Only 15 Minutes a Day Can Do For You

Are you ALL MAN—tough-muscled, on your toes every minute, with all the up-and-at-'em that can lick your weight in wildcats? Or do you need the help I can give you—the help that has already worked such wonders for other fellows, everywhere?

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Almost two million men have sent for and read my book, **"Everlasting Health and Strength."** It tells you exactly what **"Dynamic Tension"** can do. And it's packed with pictures that SHOW you what it does. Results it has produced for other men. RESULTS I want to prove it can get for YOU! If you are satisfied to take a back seat and be pushed around by other fellows week-in, week-out, you don't want this book. But if you want to learn how you can actually become a NEW MAN, right in the privacy of your own home and in only 15 minutes a day, then man!—get this coupon into the mail to me as fast as your legs can get to the letterbox! CHARLES ATLAS, Dept. 6J, 115 East 23rd St., New York City.

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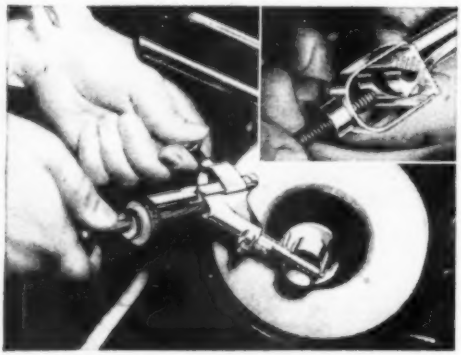
NEW PRODUCTS AND INVENTIONS

LATEST HOME AND SHOP DEVICES • POPULAR PATENT IDEAS



A new drill sharpener for the home shop is now being put on the market. It will sell for a popular price that will put it within reach of virtually all shop fans. The sharpener holds drills of from 3/32" to 1/2", and does an efficient sharpening job in a few seconds. Attaching to the shaft of your grinder, the tool holds drills at the correct angle to obtain a perfect cutting lip.

Above right: Slipping over the end of a broom handle or other handle, a rubber cap recently introduced acts as a "bumper" and hanger. The soft rubber stretches to accommodate any normal handle size, and a vacuum action helps hold it in place.

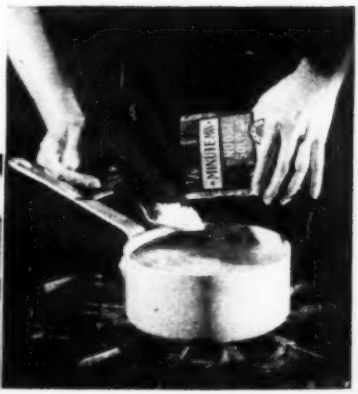
Left: Ordinary light bulbs contain "attraction" rays in the violet end of the spectrum which bring the insects. These new bulbs are specially treated on the inside to filter out these rays, with the result that the light is soft and easy on the eyes but repulsive to insects.

The radio unit seen at right should find wide usage in centralized hotel radio systems, hospitals and industrial plants. It provides both FM and AM broadcast reception, so will be particularly useful in locations where static is bad. The set includes three units; an FM/AM tuner, a high fidelity 25-watt amplifier and a monitor speaker, all inclosed in a single rack of the table-mounting type.

Soups minus the water that normally accounts for 80 per cent of their bulk and weight are now being marketed in envelope-like packages made of air- and moisture-tight Pliofilm. These will keep indefinitely as long as the envelope is not opened.

[*Continued on page* 131]

Names and addresses of manufacturers of products described above will be sent free to any reader on request, provided a stamped, return envelope accompanies the inquiry. Mention date of issue when writing.



A frank man-to-man talk about PATENTS—INVENTIONS AND SELLING INVENTIONS

The world of invention moves on. Yet about fifty years ago, some people were saying, "Well, there isn't much left to invent." Today we know that is one of the funniest things ever said. Just think what has happened in the last fifty years! Autos, radios, airplanes and thousands of useful, practical devices for home, shop and office have been put on the market. Inventors are constantly making the world a better place to live in.

Interesting examples: Hans Wach, an obscure worker, invented a simple device to utilize exhaust steam on ships. A report states that *already steamship lines have saved more than $15,000,000 on fuel bills with his invention.* The Department of Commerce has announced that it will test out a new airplane. The inventor states that the average man can learn to fly in a day; that it will travel at the rate of 110 miles an hour and will sell at the price of a cheap automobile. Seattle man invented a robot to go 5,000 feet under the sea and recover millions and millions of dollars worth of gold lying at the bottom of the ocean since the days of the early Spaniards.

LITTLE IDEAS MAY HAVE BIG COMMERCIAL POSSIBILITIES!

But remember this: For every outstanding, big invention, there are thousands of small, simple things for use in the home, office, factory, on the farm, on every sort of conveyance. Little articles like you find on the counters of a 10-cent store, hardware store, drug store, toy and novelty shop. A person finds something that doesn't work right, or it's clumsy or costs too much. He gets a happy thought. He improves the old article. That's a contribution to human progress. That's the way that many, many men have reached the goal of financial comfort, independence and even wealth. Most of the things we use today didn't come from the brains of engineers and physicists. They came from the mind and perhaps the crude home workbench of Mr. Average Man, busily engaged in earning his bread and butter at whatever chance of circumstance has given him to do. The "LITTLE" MAN'S OPPORTUNITY AS AN INVENTOR WAS NEVER GREATER THAN IT IS TODAY.

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Chips from the EDITOR'S WORKBENCH

WE WANT to tell you about the fresh guy who button-holed us in the hall the other day.

"Say," this bird began, "where do you go to dream up all the crazy military gadgets you fellows run in MECHANIX ILLUSTRATED? Some of the drawing in your book look like products of our local bug house. Take that yarn, 'Drafting The Sun For Defense,' which you had in the June issue—that was the silliest thing I ever heard of. According to the author, all you have to do to blow up a warship near our shores is focus a detonator on it, and when the sun begins to work, the ship explodes! Who ever heard of such a thing?"

Well, we told this guy, probably very few people heard "of such a thing" until it ran in MECHANIX ILLUSTRATED. Since then, though, quite a few people have heard of it, and, while some of them might have agreed with our friend that the idea looked a bit screwy, certain other folks took it in the serious vein in which it was written.

Take the U. S. Army, for instance. The Army, we've just learned, has invited the inventor of the detonator, Mr. Otto H. Mohr, to come to Washington to supervise the construction of "the silliest thing ever heard of" for use in defending our shores against the enemy—if and when he comes! It's all a big secret, and the government brass hats aren't letting everyone in the world know about their new weapon.

But MI readers *know* about it, and we think the guy who stopped us in the hall knows about it too!

* * *

WE HAVE been rather interested in reading the comments of some of the folks who won prizes in the late MI contest.

Gene Diorio, who won the airplane, was de-

[*Continued on page* 14]

Not satisfied with the regular "box on wheels" type of trailer, the members of the Tri-City Gas Model Club, when they found they needed a means of transporting their model air planes to various contests in the Middle West, took the plans for a trailer from MECHANIX ILLUSTRATED and constructed the trailer shown in the above photograph.

"It's the perfect answer to our problems," writes Tom Griberg, of 423 Fifteenth Street, Moline, Ill., a member of the club. "We are proud to tow it onto any airport."

Our heartiest congratulations to the Tri City Gas Model Club. We are sending an Editor's Workbench check for $5.00 to the club through Mr. Griberg and hope it may provide an airport party for them.

This FREE BOOK Helps..

INVENTORS

TO PROTECT THEIR INVENTIONS

How To PROTECT YOUR INVENTION

Are you unsettled about the future? Uncertain about working conditions? Concerned about the security of your family—yourself? Does the way ahead seem veiled in doubt, leaving you fearful of the years to come?

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Editor's Workbench Chips

[Continued from page 12]

lighted, of course, and his letter, which we ran in the July MI, attested this fact very well, we think. Louis Grossman, who won the Deagan Marimba, came in to confess he had never seen a marimba and was wondering just what he'd do with it if he got it at home. Mrs. Alice Dunham, our Kentucky housewife who walked off with the Indian Motorcycle, also was a bit nonplussed, but she rallied quickly and insisted she couldn't have been any happier if we'd awarded her a tray of diamonds.

Typical, however, was the note from W. O. Dalton, of Dallas, Texas, who won the Handee Artizan Workshop Tool and who expressed his joy pretty much as follows:

"I find this a most amazing and interesting tool and one that has afforded me loads of pleasure in the few days I've had it. I consider myself extremely lucky."

* * *

HERE is a note we think is well worth everyone's attention. It is from Mr. William Pedras, of Madera, California, and it goes like this:

"In your last issue, the article concerning the drafted men—in which it was stated that 45% of them are physically unfit—struck me as being most interesting. I have been trying to establish a hobby center in this city, and those that really need it (like the 45% mentioned above—Ed.) are the ones who scoff the most. I mean to establish a workshop so that all who care to do so may take advantage of its facilities and space, with competent leadership provided.

"Right now, our group is engaged in model plane construction, midget auto building, model trains, woodworking, art work and light carpentry. I should like to hear from others of your readers to see what their ideas are on a project of this kind, since our present attendance is rather small, and we would welcome any tips on how to increase it."

What do you say, Workbenchers? Can anyone help Mr. Pedras in his project, and perhaps tell him how he can attract some of the other good burghers of Medera?

* * *

ANOTHER good book on aviation, in which we think many readers will be interested, has just come to our desk. It is called "The ABC of Aviation" and was written by Lt. Col. Victor W. Page.

[Continued on page 16]

An attractive wife who is willing to lend a hand is quite an incentive to any shop enthusiast. And William B. Lollar, 953 Fifth Place W., Birmingham, Ala., is fortunate enough to have such help, as the above snapshot proves. With such help, he built the *Patty*, shown in the upper picture. "My wife pitched in with a sewing machine to make the canvas covering as well as the sails. The total cost was about $20," he writes. "Plans were very easy to follow." Mr. and Mrs. Lollar get a $3.00 prize.

This steam locomotive model, five feet long and 15 inches high, burns soft coal and has pulled seven passengers with ease! It was built entirely on a 9" lathe and drill press, by Richard Stozenfels, 333 Seventy-eighth street, Niagara Falls, N. Y. We think it is a remarkable piece of work and are awarding it a $3.00 Editor's Workbench check.

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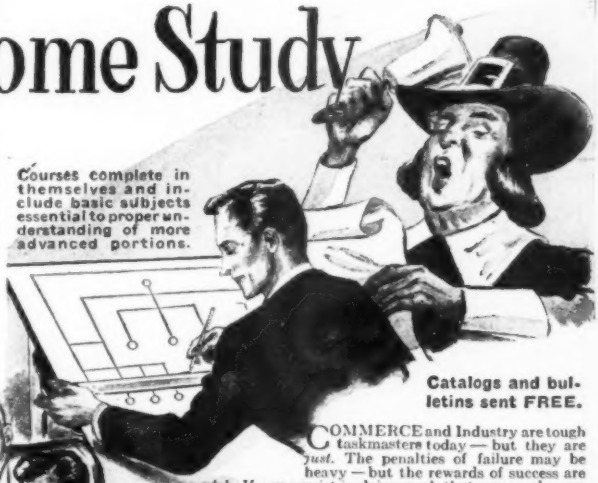

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Editor's Workbench Chips

[*Continued from page 14*]

The book seems to be about as up-to-date as it's possible for an aviation book to be these days with planes becoming obsolete almost as fast as you can rush a picture of one to the printer. It's complete, lavishly illustrated and also carries an instruction manual for students of aviation, for those who hope to study the science some time in the future.

* * *

AN EVENT of great importance took place in New York on the evening of June 26. On that day, diplomas were handed to the first graduates of the city's new High School of Science. Dr. Irving Langmuir, Nobel Laureate in Chemistry and president of the American Association for the Advancement of Science, was the principal speaker as 130 boys who made up the school's pioneer class took another step toward a career in the world of science.

We were particularly interested in this class of boys all during their high school career, mainly because we happen to remember the pains that were taken before the school opened to get the right kind of students. Out of 5,000 applicants only 2,000 were accepted, and these had to answer in essence, the following questions:

1—Is he interested in and does he do well in science?

2—Does he possess certain fundamentals in vocabulary and in arithmetical reasoning?

To the list of war-like models, add this 16-inch model railroad cannon made by Raymond W. Bull, Jr., of 917 Madison Ave., York, Pa. The cannon is in quarter-inch scale, built from an old .22 rifle. It shoots .22 shells and blanks. The car is 16 inches long, with two pairs of train trunks. When the cannon barrel is raised it stands 15 inches high. Mr. Bull wins a $3.00 Workbench check for his idea and snapshot.

Editor's Workbench Chips

3—Can he extract meaning from the printed page?

That the 2,000 boys accepted answered these questions satisfactorily can well be imagined, and, as far as the 130 graduates were concerned, you can bet *they* went even further than that and showed decided signs of being our future leaders of scientific thought in America. If nothing else, everyone of them admitted on graduation day that he was determined to make a career for himself in research, engineering or medicine. At this point in the history of America, there are the men we need.

To them all, we say—good luck, boys!

* * *

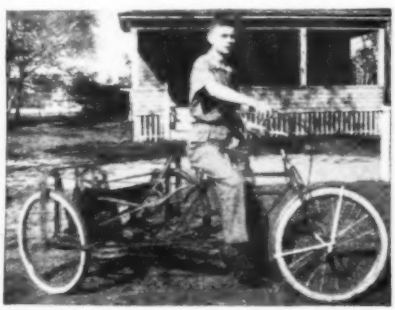
RIGHT here, we'd like to settle a few questions that have popped up about the story "I Flew My First Time Up," which appears on pages 35, 36, 37, 38 and 39 of this issue. Maxwell Hamilton, who wrote the yarn, tells us that almost everyone who read the story of how he took off, flew and landed a plane, the first time he ever was up in one, simply refuses to believe it.

"Come on, now how about it?" they whisper confidentially to Mr. Hamilton after he has permitted them to read a draft of the yarn. "You really didn't actually *fly* that ship, did you? Surely someone else took it off and landed it for you!"

To all of which Mr. Hamilton has but one answer: "You read the story, didn't you?" he asks. "Well, I'm not in the habit of chewing my potatoes twice. If you don't believe it in print, you'll never believe it in the spoken word."

So, right here Mr. H. wants us to tell the MI

[*Continued on page* 19]



A one-wheel drive motor scooter with a front wheel brake, the original idea of Donald Ireland, Goose Rocks Beach, Maine, is shown in the above photograph. "Your Editor's Workbench, which I greatly enjoy, gave me the idea for building it," he writes. "It has a muffler made from an old oil can. The clutch is of the idler pulley type and works from the original pedals of the old bicycle from which I built the scooter." Donald says it will make 200 miles to a gallon of gasoline. It is powered with a ½ h.p. washing machine motor. We're sending him our best wishes for swift rides along with an Editor's Workbench check for $3.00.

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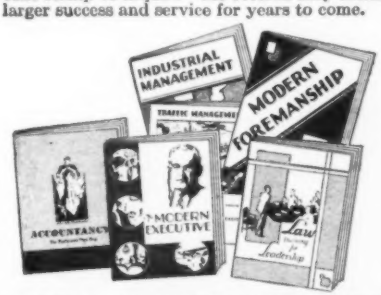

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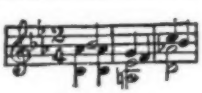
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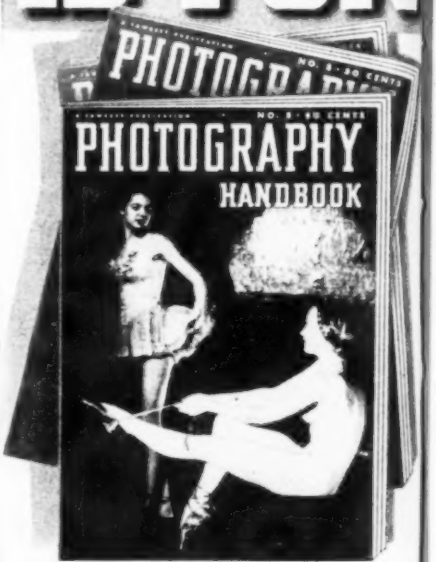

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Editor's Workbench Chips

[*Continued from page* 17]

readers that every word of his yarn is the truth—and you can take it or leave it. (He's a hard man, this Hamilton!)

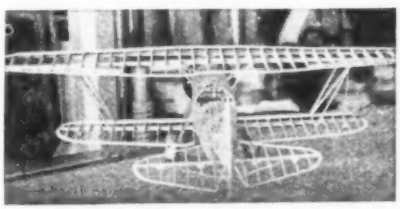
* * *

HOW many inventors are there in America? In case that question has been troubling your sleep these hot nights, don't expect to find the answer here. We wouldn't begin to know how many inventors there are in the country, and we don't think very many other folks know the answer either, for the simple reason that, even if you get a figure in round numbers, it doesn't begin to catalogue all the folks who invent things and never do anything about getting them patented.

However, here's a rough idea for you: In one week during June, the government issued 938 patents! Think of it—938 in one week!

Of this crop of brain-children, the ones that stood out were a telephone that can be used while the person using it is wearing a gas mask, a lawn mower that's guaranteed to cut high grass, and

[*Continued on page* 20]



This model of a Navy F11C-4 was built for a pilot at the Norfolk Naval Air Station by Lloyd C. Weygint, 503 First View, O. V., Norfolk, Va. "The Navy flyer was more than pleased with it," he writes. Interesting detail is the instrument panel. It is completely controllable from the cockpit. "I'm getting tired of seeing other fellows win that Workbench award," Lloyd says in his letter. Herewith the $3.00 award for him!

It took 8,000 working hours to complete the above model of the "Flying Cloud," according to Roland T. Dobbs, 2459 So. Albany Ave., Chicago, Ill., its builder. Approximately 4,000 parts went into it. The hull is of ponderosa pine, while other parts are of bass and oak. The figurehead is hand carved and all such parts as buckets, water casks, capstands and shackles are hand made. For his patience and skill, we are awarding Mr. Dobbs a Workbench prize of $3.00 this month.

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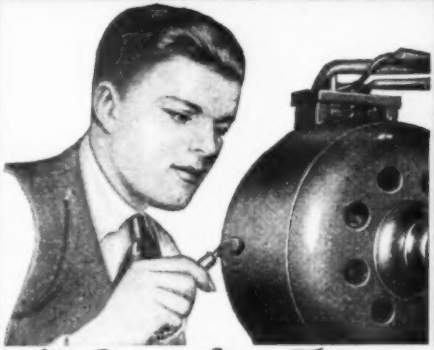

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Editor's Workbench Chips

[*Continued from page* 19]

a breech block that is supposed to open and close the breech of a small-calibre gun automatically.

The point is, though, that if you're an inventor, you needn't worry about the Patent Office ever getting around to your discovery. If they can get around to 938 of them in one week, they'll probably reach 'em all some day!

* * *

MANY readers apparently misunderstand the purpose of our story "You're Wanted For A Defense Job," which appeared in the July issue. You'll recall that, along with that yarn, we ran a questionnaire which would help you readers figure out whether you had some talent for some particular line of defense work.

Some of our parishioners, however, seemed to think that all one had to do to get a job was to fill out the questionnaire and send it to us, which wasn't the idea at all. We're mighty interested in seeing how smart you are, of course, but beyond that we can't go. We don't know many employers, and we probably couldn't get a job ourselves if we lost the one we have now (Heaven, of course, forbid).

So, if you filled out *your* questionnaire, we hope it helped you decide the job you'd like to have. If it did, that's the news we've been waiting to hear.

* * *

MARK TWAIN'S now threadbare gag about the weather and the fact that no one ever does anything about it seems about ready to be laid away in lavender. Loads of people are doing things about the weather these days, though, we must confess, we haven't heard of anything constructive being done about the 90-degrees in which this is being written.

There was a chap in Brooklyn, New York,

The small son of W. B. Johnson, of Norris, Mont., doesn't have to wait for Christmas for toys. Mr. Johnson turns them out regularly on his own lathe. The model steam shovel and steam roller shown above are samples of his work, the wheels, pulleys and various other parts all turned out by himself, for his son's delight. Possibly a Workbench check for $3.00 will provide the parts for some new project for Mr. Johnson. We're sending it, with our regards.

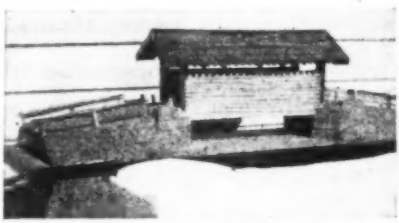
Editor's Workbench Chips

for instance, who made a bet that he could forecast the weather better with an old rabbit's foot than the Weather Bureau was doing with all its high-powered instruments. He tried it for 30 days and the contest ended in a flat-footed tie.

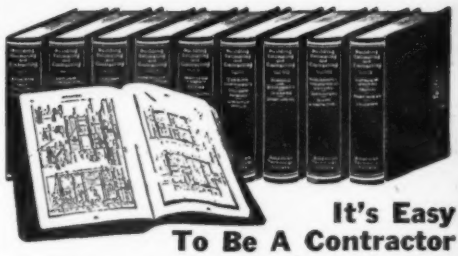
The guy who really seems to be making a fortune out of the atmospheric situation, however, is Dr. Irving Krick, about whom you'll find a swell feature beginning on page 64 of this issue. Dr. Krick's stunt is to wet his finger, stick it into the air and tell you immediately what it's going to be doing next New Year's Day. The funny thing about it is that he's nearly always right!

Actually, of course, Dr. Krick is a bit more scientific about his predictions than the wet finger would have you believe. But read his story, and we're sure you'll realize that weather prognostication is due for a marked change in this country in the next few years, and that it won't be long before we'll be able to know two months in advance what kind of weather we'll have on our annual vacation.

[*Continued on page 22*]



Will B. Dickson, 4135 Park Ave., Indianapolis, Ind., is President of the Hoosier Home Workshop Club, Inc., and has a unique workshop hobby. He builds actual scale models of covered bridges. The photograph above shows his model of a covered bridge now standing in Orange County, Indiana, over the Patoka river about five miles south of Jasper, Ind. Mr. Dickson has models of many different types of covered bridges, including two- and three-way drive, lattice style, walkway and double walkway, all constructed from actual measurements taken on the scene. For his unusual report and his photograph, we are sending him an Editor's Workbench $3.00 award.



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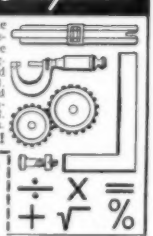

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Editor's Workbench Chips

[*Continued from page 21*]

WE KNEW we had something when one of our staff writers came in one day with the story on saboteurs, which you'll find beginning on page 40 of this issue. We never had any doubt of the fact that it was, to say the very least, a most sensational yarn. We were convinced, however, when the FBI announced the arrest of 29 spies on the very day that our story was being sent to press!

Now, naturally, we're not trying to claim that we are psychic, or that we have an "in" in the FBI, or that one of the spies gave us the information for our story before he got himself arrested. What we do say is that this mass arrest of spies proves that the information contained in our article, "Is There A Saboteur In Your Plant?" is authentic and not something dreamed up out of a reporter's skull.

We are not alarmists. We do want to bring you MI readers the facts, though, while they're so timely they're red hot.

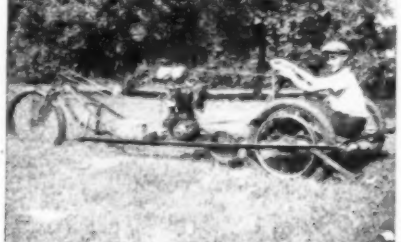
* * *

WE HAVE been guilty in the past of doing something we hope never to do again, and that is running news pictures of the "biggest" of the "smallest" so-and-so of its type in the world. We have had pictures of "the biggest tea-cup," "the smallest windmill," "the biggest dynamo" or "the smallest icthyosaur."

Now, we hope, all that is behind us. No more running pictures of anything whose only claim to fame is that it's the biggest or the smallest of its species in the world. We do hereby resolve that the era of writing The Lord's Prayer on the head of a pin is past and that, in the future, to rate space in MECHANIX ILLUSTRATED, a picture will have to be of genuine scientific or mechanical interest to our readers.

(All contributors please copy!)

—*The Editor*



If you think there's no new twist in three-wheeled cars, take a look at this "open air" job built by Kenneth Stensland, of Edinburg, N. D.! Made of old motorcycle and bicycle parts and powered by a second-hand motorcycle engine, it is a real speedster, according to Kenneth. It is steered by an automobile gear attached by two long rods to the single front wheel. It is also well ventilated, and we're sending Kenneth a $3.00 Workbench check to buy him a muffler either for his car or his throat!

Letters To The Editor

To the Editor
Dear Sir:

I read MI every month. I find its contents extremely interesting. However, in your July issue, I got a big laugh out of your one, "You Are Wanted For a Defense Job." Did you ever try to get a job through the State Employment Service? You should. It's a great indoor sport. First, you go stand in line while a few employees smoke cigarettes, drink pop and pass the buck from one guy to the next. Next they ask you enough questions to qualify them as attorney general. Then you go home and wait and wait, for weeks, and finally comes a little card asking you if you are still seeking work. You answer, yes, and wait some more. Then another little card asking the same question. It would go on for years if you didn't get wise, finally, and throw the card in the wastebasket.

The writer is 39 years of age, with 15 years experience in builders' hardware, can read blueprints, have had experience in civil engineering. I like to work with tools, have a wood machine hobby shop at home. I studied law three years—and can't even get a job digging ditches, though my health is good and I am willing. Yes, your magazine is good, but I challenge you to get me placed in a job!

George Stevens,
Y.M.C.A., Albany, Ga.

* * *

To the Editor
Dear Sir:

I have been granted three toy train and trackway inventions. Right now I have some ideas for creating new things in a different branch, which would require the help of someone experienced in radio, television and phonograph in order to develop them properly. I am, therefore, trying to locate such a person who would be willing to help me perfect these ideas and if possible be financially able to apply for patents, for a half interest in the invention. Could you suggest any such person?

Patrick E. E. Coderre,
58 Washington St., Port Chester, N. Y.

* * *

To the Editor
Dear Sir:

I would like to know of any dangerous jobs that pay fair wages—any job that is too hot for the average man. Do you know any company, for instance, that would give a man a job racing automobiles on a percentage basis?

Thomas Stoner,
Buck Grove, Iowa.

[*Continued on page 24*]

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5.25-17	2.45	1.15
28x5.25-18	2.45	1.15
29x5.25-19	2.45	1.15
30x5.25-20	2.50	1.15
31x5.25-21	2.60	1.15
5.50-17	2.75	1.15
28x5.50-18	2.75	1.15
29x5.50-19	2.75	1.15
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Letters To The Editor

[*Continued from page* 23]

To the Editor
Dear Sir:

Your article by Donald G. Cooley on defense jobs was most interesting, particularly the reference to the demand by aircraft companies for cylinder honing machine operators.

I do not know a thing about honing machine operation, but I have had approximately six years of machine shop experience and have operated such machines as planer, turret lathe, engine lathe punch press, drill press, ream cutters, etc., etc.

I worked on a planer where the value of the job on the table at each setting up was $375.00, and have worked on a turret lathe to as close a tolerance as 4/1000th of an inch. Therefore, I am highly interested in getting a chance at one of those honing machines. I believe I can learn to do the work and am writing to you in the hope that you can put me in touch with a foreman or two such as Mr. Cooley mentioned.

As a steady purchaser of MECHANIX ILLUSTRATED, which, since it came upon the market, has supplanted the other magazines of its type, I can say that the magazine answers a very definite and pressing need to those of us who like to work with tools, as well as assisting us in keeping abreast of the times with its display each month of the latest in invention and design. No doubt most of your readers feel as I do that if they had but one choice, it would without hesitation be MI. And when you consider that I can say this so soon after finding out that I was only an "also ran" in your contest, you can see that I mean it!

Arthur W. Stevens,
215 Washington St., West Pittston, Pa.

* * *

To the Editor
Dear Sir:

Your article, "You're Wanted For a Defense Job," is very interesting. However, I am at a loss to know how a draftee can take advantage of this situation and make himself useful.

Without hesitation, I can answer, "yes," to every question on the job questionnaire—and yet here I am assigned to what we call bunk fatigue in the army!

I have worked on what the railroads call their signal department. We installed and maintained the automatic signals that keep the trains moving. A successful signalman must be an all-around mechanic and a reasonably good electrician. He must possess some leadership ability and be able to handle clerical work, because in most cases he takes over an entire job with no help. I have been able to handle a job like this successfully—and yet I have been taken away from it in spite of the fact that qualified men are not available.

As evidence of the fact that qualified men are

[*Continued on page* 33]

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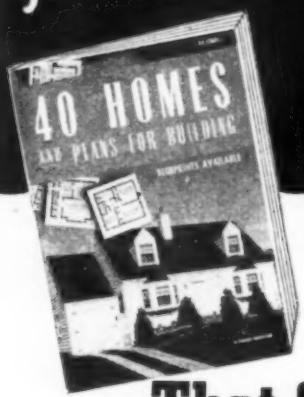

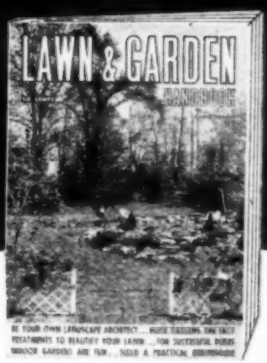

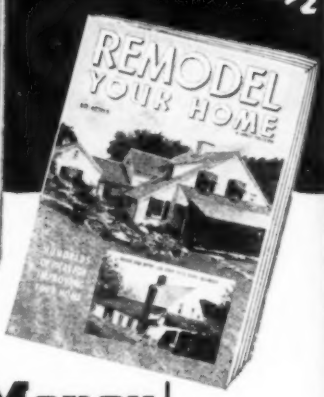

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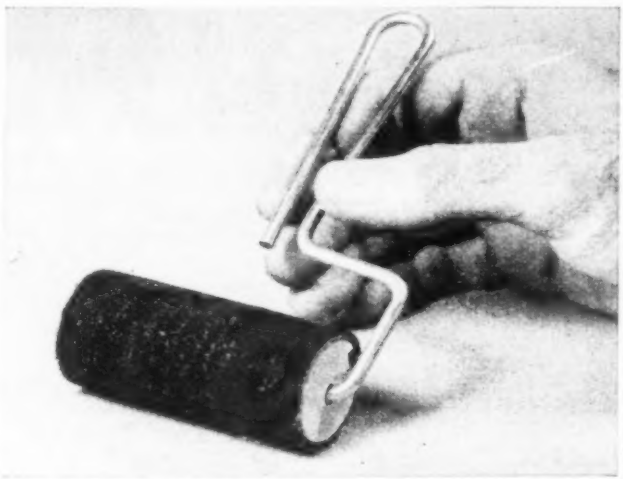

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Letters To The Editor

[*Continued from page 24*]

scarce, I refer to page 270 of the May issue of Railway Signaling, in which the Western Pacific Railroad asks the Interstate Commerce Commission for a two-year extension of time to comply with modernization of their signals, giving as one of the reasons the difficulty in securing competent workmen.

I might mention that my case is not the only one like this. There are many more, and if this defense program is to be successful, someone should sponsor a movement to have each man placed where he is best fitted, regardless of age.

U. C. Waigand,

Belleville, Ill.

* * *

To the Editor

Dear Sir:

I have always wanted to build a sail boat and when I saw the drawing of the 32-foot skipjack in your June issue I knew it was just the type I wanted. I always thought a sailer would cost a small fortune but Mr. Emmet's article was like an answer to my prayers. I would like to see more articles like this in MECHANIX ILLUSTRATED.

Jim Cranor,

Howard, R. I.

* * *

To the Editor

Dear Sir:

My wife read, "At Home on the Range." She bought an air pistol, and now every time I come home late she plugs me. I'm going to sue, Brother!

Ab Wentworth,

Dewey, S. D.

* * *

To the Editor

Dear Sir:

I want you to know that MECHANIX ILLUSTRATED is one of my favorite magazines. It certainly gives a lot for its low price. I particularly like the quiz page.

George Nemitz,

Route No. 2, Cedarburg, Wis.

* * *

To the Editor

Dear Sir:

I have just read in your July issue of MECHANIX ILLUSTRATED of the need for skilled labor for national defense work. I would like to be of some help, but do not know of the places that might need me.

I have taken a course in radio and have done considerable work in that line. If you know of any place that could use me, I would appreciate it very much if you would let me know.

Walter R. Brooks,

Hinsdale, N. H.

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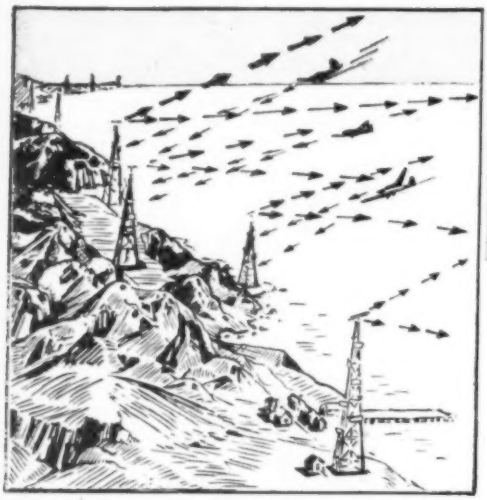
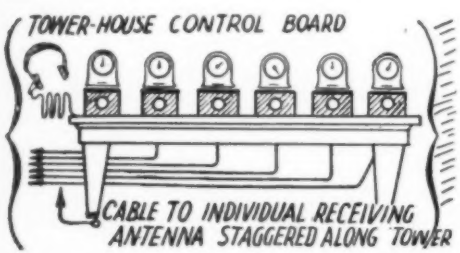
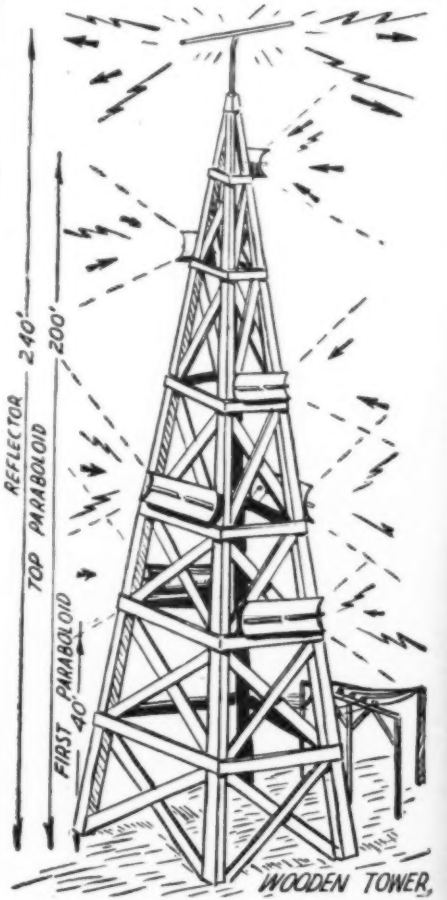
British Radio-locator Secret Revealed



MYSTERY of Great Britain's radio-locator, which spots approaching Nazi bombers, has been penetrated by Dr. Lee de Forest and explained by means of these sketches. Radio-locators consist of detecting mechanism mounted on 240-foot towers around the British coast. Atop each tower is a huge reflector which throws a cone of radio beams into the sky. When a plane comes within the cone, the beams are reflected back and picked up by parabaloid directional receivers on the towers. Dipole antennae register intensity according to distance and altitude and give location of enemy plane instantly. Major Malcolm Wheeler-Nicholson accurately forecast these radio-locators in August MECHANIX ILLUSTRATED.





I Flew My First Time Up!

by Maxwell Hamilton

Now it's easier to fly a plane than it is to drive an automobile. You needn't spend months learning — you just climb in and take off!

Before the takeoff I looked like this—a little tense.

IT WAS to be my first flight.

The instructor, as we strolled across the field toward the sleek silver dwarf of a plane, voiced his surprise to learn that an adult male existed who hadn't flown as a passenger in an airliner, who hadn't tried a Sunday afternoon sightseeing flight, or who at least hadn't sat in a ship while she taxied around the airport. I assured him I had never been higher than the Astor Roof.

"Okay," he laughed. "Climb in. Today you're going to fly—and, brother, I mean FLY! You're going to take this crate up, tool it around up there and then land it, all by yourself!"

He wasn't kidding either. Two minutes later, I sat strapped in the cockpit beside him as he taxied the little plane toward the runway. There were dual controls, and he explained perfunctorily what they were all about. The wheel—just like an auto's—steered in the same way. When you turned it to the right, you went to the right, and to the left when you swung it to the left. You went up when the wheel was pulled toward you and down when it was shoved away. There

Below: A rear view of the Ercoupe, showing its two widely spaced rudders.

Above: The Ercoupe's instrument panel. All steering, climbing and descending is effected with the hand wheel; the feet have absolutely nothing to do. That's the throttle between the wheels. The brake is directly below it.

Left: An unusual feature of the Ercoupe are these diagonally set wing ribs. They're strong and light.

was a throttle and a brake.

"That's all you need to know," my instructor said. "Go ahead, grab the wheel. We'll just taxi around here a bit till you get the feel of it. Notice she steers on the ground just like your car? Well, she flies the same way."

It was a cinch. I cruised around that field with the ease of a motorist out for a Sunday spin. The instructor kept his hands in his lap except when it was necessary to open the throttle for more speed.

Suddenly I noticed something—we were moving pretty fast for a plane that was supposed to be taxiing. It seemed to me, as I held her on a straight course, that the little ship must be edging sixty. Still the instructor kept that one hand in his lap and the other on the throttle.

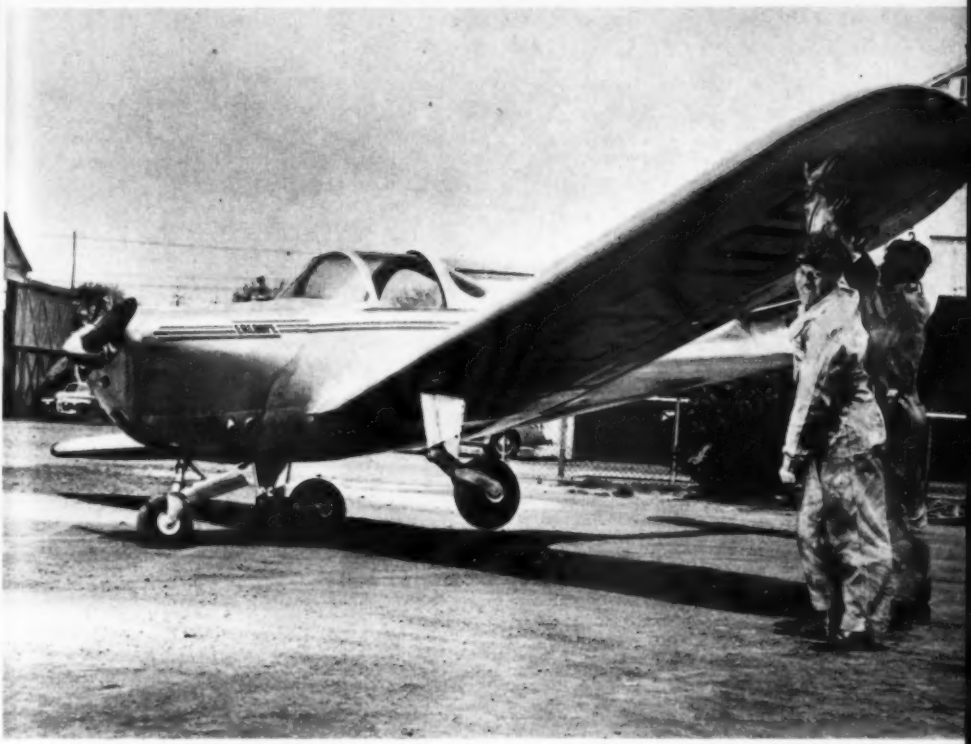
"Okay!" he yelled suddenly, over the roar of the motor. "Pull back your wheel slowly, very slowly—and keep her heading straight." I did what he said—don't ask me why—and suddenly—

We were in the air!

I figured I must have let out the biggest gasp in history, for the plane seemed to lurch and bump like a plunging speedboat. Still I clung to that wheel like a drowning man to a spar. My back was so taut it hurt.

"Come on, relax!" my companion shouted. "You took her up nicely. The rest is easy. And don't mind the bumping—it's a bit rough down here, but it'll get smoother when we get more altitude. You just go ahead and fly—you can't get *this plane* into any spot I can't get her out of in one second flat!"

As a matter of fact, he turned out to be absolutely right. "This plane" flew like an eagle, and



Here's how the landing gear compresses to absorb landing and taxiing bumps. It rides like an automobile.

despite the novitiate clumsiness of my studied banks, turns, climbs and plunges, more than an hour passed during which I experienced no greater sensation of danger 3,000 feet above the ground than I might have felt had I been treading the earth's surface. In truth, at times I was close to boredom!

Behind this sensational first flight is a dramatic story. Rather, behind my virtual solo—the first time I ever was *in* an airplane —stands a most amazing aircraft.

They call it the Ercoupe. Further than that, they call it The Foolproof Airplane. Harry, the high school hero, could fly it easily after two minutes of instruction, since it handles with about three times the ease of the average over-age automobile.

Furthermore, it has advanced aviation almost to the millennium, since it is absolutely spin-proof.

The Ercoupe is the product of the Engineering and Research Corporation of Riverdale, Md., which is another name for Henry A. Berliner and Fred E. Weick. These two—one a business man and the other an engineer—have fired this shot which is expected to do the most to put the airplane into the hands of Mr. and Mrs. Smith, the average Sunday drivers of Mt. Savage, Md. Looking at it, your wife is apt to call the Ercoupe "cute." And, alongside of most planes, this new flying machine merits the description. It just about reaches your waistline, and you have the feeling you want to tuck it under your arm to protect it from bigger, stronger-looking craft.

But the Ercoupe is tougher than it looks. It is all-metal, except for the fabric on its wings, and its tricycle landing gear has the combined advantage of permitting you to steer it on the ground and preventing you from doing any ground-loops. Its 65-horsepower engine gives it a landing speed of 45 m.p.h., a cruising speed of about 95 m.p.h., and a cruising range of approximately 350 miles.

And built into this little ship are safety factors of which no other plane, light or heavy, can boast.

I did my flying at New York's Roosevelt

Above: Front wheel strut "stretches" like this when Ercoupe flies. Notice that it's turned to the left. Below: Engine compartment. The motor is mounted at an angle to counteract the propeller torque.

Field in a plane especially provided for me by the Ailor Fly-Ur-Self Service, an organization which rents out these jobs to licensed pilots the way the drive-yourself boys do with automobiles. The license you get to fly an Ercoupe, however, is a bit different from the average pilot's papers, since the Ercoupe's safety factors are taken into consideration when you make your test flight.

The one drawback in the perfect picture of this amazing plane—insofar as I could see—is its price. At the moment it will cost you $2,590 to fly one of the things away from the factory—and most citizens are inclined to regard that as quite a sizable stack of greenbacks.

My companion, however, on my first flight—Andrew Boyajian—didn't seem to look upon price as a stumbling block. "After all," he said, "after flying one of these ships, you're sure to want one sooner or later—so you may as well order it now, and make it sooner."

Before going aloft he showed me some of the features that make the Ercoupe the sensation it is in the light plane field. There was the double rudder, for example, one blade of which turns a fraction of a second quicker

Above: This three-quarter front view shows the simplicity and low-slung lines of the little airplane. Left: On an even keel, the under-carriage looks like this. It doesn't retract. In flight, fairlings streamline struts.

than its mate. He didn't say so, but Boyajian more or less let me believe that the spinproof qualities of the ship were somewhat the result of this eccentric rudder condition. Precisely why it's spinproof, however, is a trade secret.

Boyajian also waxed enthusiastic about the plane's ability to steer on the ground just as an automobile does, a quality not found in other ships. The hand-brake was another item calling for special demonstration, since Boyajian explained that the absence of some kind of a brake on other planes seemed to be one of the things that confused most flying neophytes.

Unquestionably the most revolutionary feature of the Ercoupe, though, is its single control. All steering, climbing and descending is effected through manipulation of the hand wheel. Your feet have nothing to do at all; you can tuck them up under you if you feel like it, or cross your legs in perfect poolroom comfort. That's the item, Boyajian said, that annoys most trained fliers; they're accustomed to doing something with their feet when they're in the air, and

[*Continued on page* 138]

IS THERE A SABOTEUR

Ruin in the wake of saboteurs! Eight were killed in a blast that wrecked the plant of the United States Railway Signal Corp., at Woodbridge, N. J. The company was making flares for the U. S. Navy. Investigators said it was "definitely sabotage."

A staff writer for MECHANIX ILLUSTRATED spent several days in the Federal Bureau of Investigation at Washington, D. C. conferring with Federal Agents to bring you this vital information.

THE man who works next to you may be a saboteur. It is important that you know exactly what to do about it. The difference between victory or defeat for America may depend upon your reactions.

How Italian saboteurs wrecked one of 25 ships just as they were seized by the U. S. A Coast Guardsman is shown holding a torch against the cracked main driving shaft of the boat.

As an example, consider the following case, the details of which have been altered in the interests of secrecy: The foreman of an eastern plant noticed that one of his workers always brought a thermos bottle for coffee in his lunchbox but never drank anything but water from the plant cooler. It occurred to him that it was peculiar. By a bit of snooping, he discovered the workman was smuggling small precision parts out of the factory at night and bringing them back in by day in the unused thermos bottle. Presumably, the parts—of a highly important piece of defense machinery—were being measured or duplicated for foreign agents.

The foreman waited until he saw the workman slip a part into his thermos bottle the next day—and then called police.

The workman was arrested and subsequently, in a quiet hearing, was sent to prison on a technical charge.

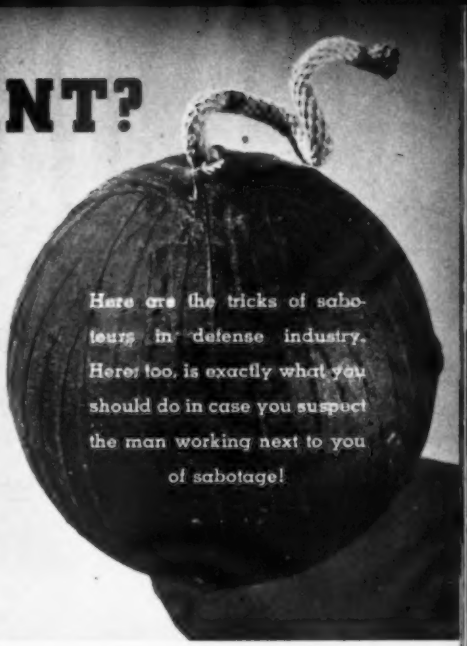
IN YOUR PLANT?

A nice piece of work on the part of the foreman? No! He did the worst possible thing that he could have done! The explanation? Perhaps it can be best explained by another example:

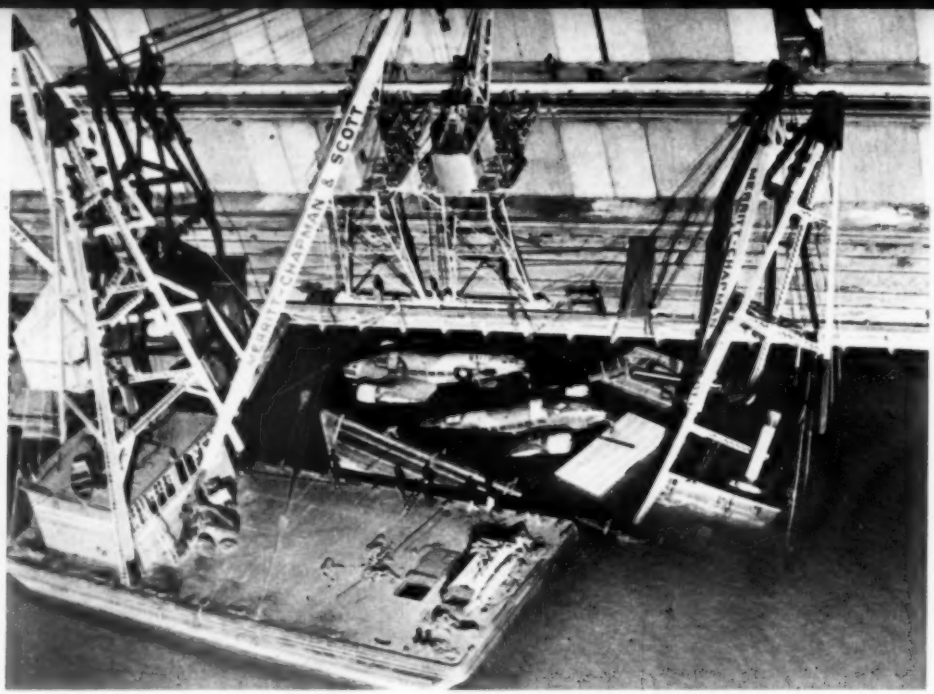
A workman in an airplane factory became suspicious of a fellow employee. For reasons which will be obvious, it is impossible to give exact details of the case. This workman watched his colleague carefully for several days until he became fully convinced, himself, that the man was committing acts of sabotage.

With no more doubts in his mind, the workman quietly dispatched a telegram to the Federal Bureau of Investigation, Department of Justice, Washington, D. C. He did not report the matter to his foreman, nor mention it to anyone else—not even to his wife.

The same day, a new man was added to the factory force. He was assigned a job alongside the workman and the suspect. He


Here are the tricks of saboteurs in defense industry. Here, too, is exactly what you should do in case you suspect the man working next to you of sabotage!

A fake bomb, officially photographed by the FBI, is shown above. It is used by saboteurs to cause panic. Below, an air view of explosion that wrecked a powder plant at Kenvil, N. J.



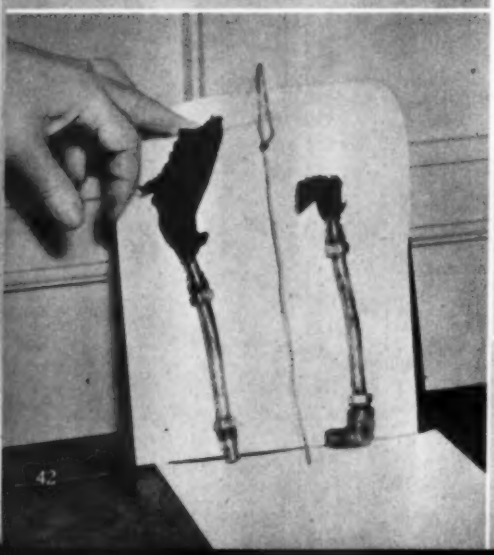
Lockheed bombers purchased for England were sunk on the deck of a lighter barge in the foreign trade zone at Stapleton, Staten Island. Was it the work of foreign sabotage agents?

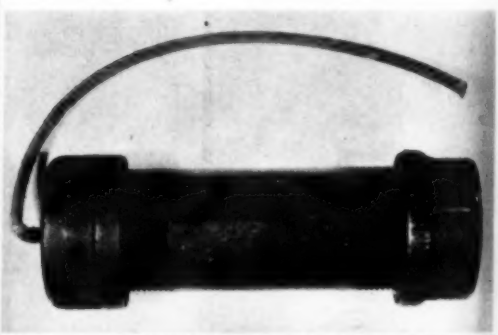
These tiny capsules contain enough chemicals to start a costly blaze in any factory.

was a quiet sort of a man with a slight foreign accent. He was also an agent of the FBI!

At the same time, the trusted workman was called quietly to the front office. He was transferred to a special, after-hour shift, at overtime pay. He was told by the boss that his job was to repair secretly the acts of sabotage being committed by the suspect.

Other FBI men "covered" the suspect 24





The photograph at the left shows how sabotage agents stuff fuel lines with rags. This is from an actual sabotage case. Above is shown a crude bomb made from a length of steel pipe. This is an official FBI picture, to show work of saboteurs.

hours a day. Soon, all of the suspect's friends and connections were known to the government agents. As the FBI demonstrated, when it rounded up 29 persons as spy suspects in one day, it knows how to act on such information. It is out after the "higher-ups" in spy and sabotage rings.

The difference? The foreman, in the first incident, became excited and did not stop to think what the result of his actions would be. He was to be congratulated for his powers of observation and his desire to uncover sabotage. But the arrest of one foreign agent in this plant still left the sabotage ring intact and operating. Undoubtedly another man has replaced the workman who was arrested. Not only was the arrest unimportant, but it warned the "higher-ups" in the ring to be more careful in this particular plant!

In the second incident, the loyal airplane workman acted exactly as he should have. He did not become excited. He did not call upon the FBI until he was certain of his facts. He kept absolutely quiet about his suspicions. He will undoubtedly receive his reward not only in the knowledge that he has served his government, but probably in more material

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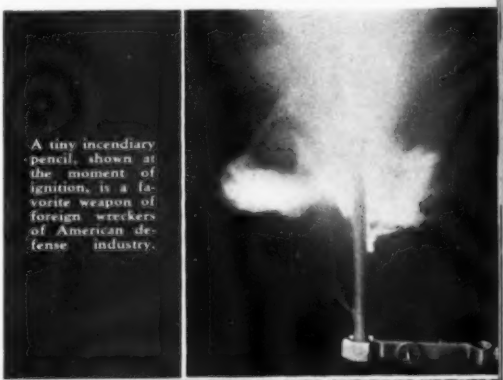
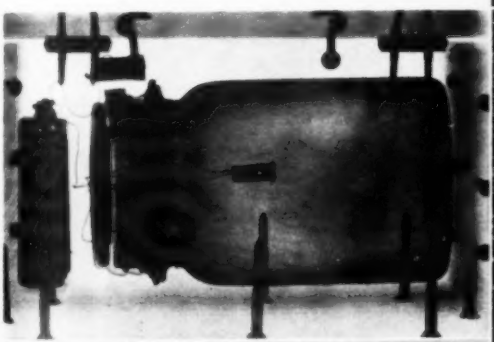
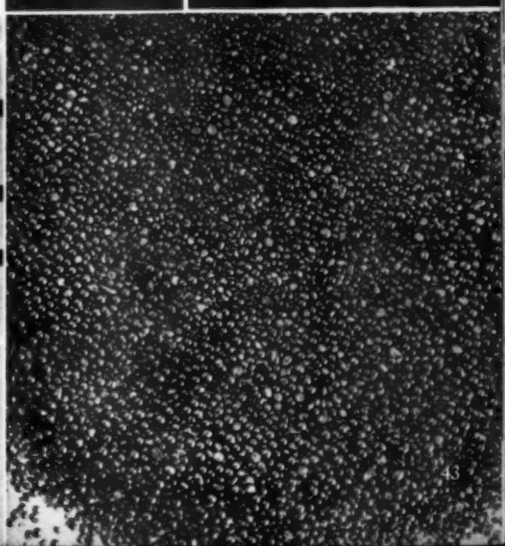
A dynamite explosion shattered the 36-inch water supply pipeline of the Cambria plant of the Bethlehem Steel Corporation. It caused a shutdown of the factory.

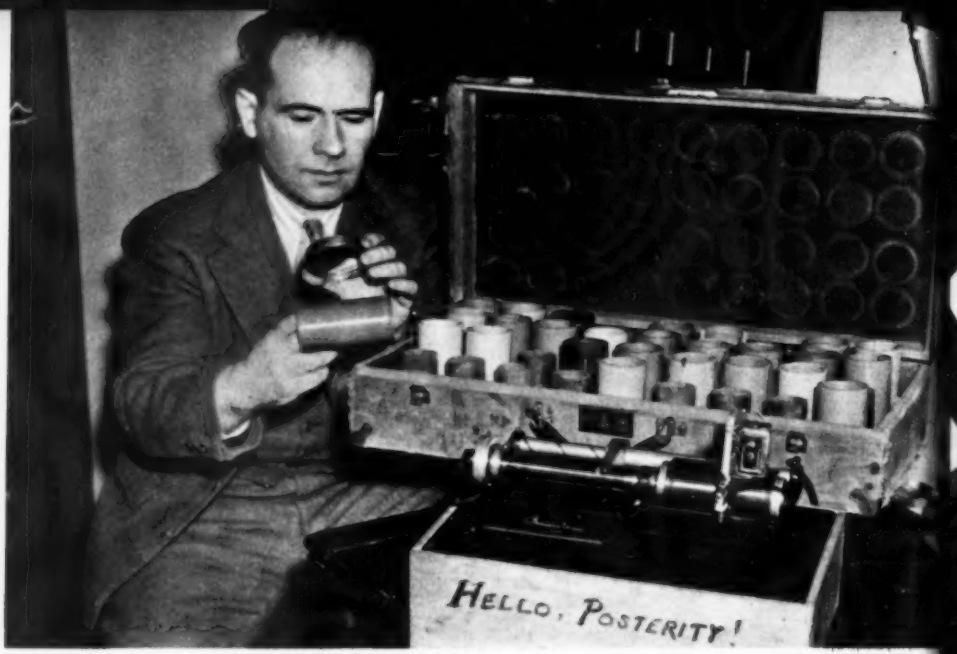


A tiny incendiary pencil, shown at the moment of ignition, is a favorite weapon of foreign wreckers of American defense industry.



The picture above is an X-ray photograph of a bomb encased in a wooden box, showing how FBI exposes deadly weapons. At the right are shown a number of particles removed by the FBI from the crankcase of an engine which had been sabotaged.





George Vincent examines his records of the great voices of history.

Voices From The Grave

One man's hobby bids fair to be the instrument through which future generations will hear the spoken messages of today's great figures.

THE record turns, the needle is set on it, and the sound of a voice is heard, a voice whose vibrant quality even the squeakiness of the recording cannot hide.

"I wish," the voice says, "to see you boys join the Progressive Party and act in that party and as good citizens, in the same way I'd expect any of you to act in a football game. In other words, don't flinch, don't foul, and hit the line hard."

That statement, recorded by George Robert Vincent as a boy, is the only existing record of Theodore Roosevelt's voice.

With some five thousand other records, seven hundred of which are old-fashioned cylinders, it makes up Vincent's voice collection, or "Vocarium," the largest and most varied private collection of its kind in the world.

Vincent, who started collecting voice recordings when he was 11 years old, now has thousands of voices on file, including those of Sarah Bernhardt.

The man who gave Vincent his start: Thomas A. Edison and staff

Mechanix Illustrated

P. T. Barnum, Jane Addams, Kaiser Wilhelm II, Richard Harding Davis, Guglielmo Marconi, Rudyard Kipling, General William Booth, Dame Nellie Melba, Rudolph Valentino, John Wanamaker, Joe Jefferson, Ellen Terry, Buffalo Bill, Helen Keller, the Mayo brothers, Mark Twain, William McKinley, Ernest Henry Shackleton, Mahatma Gandhi, Warren G. Harding, Charles Lindbergh, Christabel Pankhurst, King Albert of Belgium, Woodrow Wilson and Andrew Carnegie.

One of the records of which Vincent is most proud is the earliest record of any sort now in existence, a wax cylinder on which Thomas Edison, who was just starting his voice collection, requested his London agent, Colonel George E. Gouraud, to have Gladstone make a record. Edison's oral message goes:

Gouraud, agent of my choice,
Bid my balance sheets rejoice;
Send me Mr. Gladstone's voice.

Vincent also owns Gladstone's response, a message of greeting and good wishes spoken in the quavering, aged voice of Britain's great prime minister.

A free-lance sound-recording engineer, Vincent can't remember a time when he wasn't.

As a boy, Vincent secured the only known record of the voice of Theodore Roosevelt, shown above, for which Daniel Carter Beard, below, made the introduction.

Vincent, left, records the voice of one of today's great figures. Prof. William Lyon "Billy" Phelps, of Yale.

The instruments are set up in the Phelps library, and Vincent gives the professor the "go ahead" signal.

interested in voices. "I used to play the family gramophone," he says, "and wish that I could have heard the voices of the great characters of history, because then I would have known what they were really like."

The son of a New York doctor, young Vincent was something of a child dynamo who, at the age of eleven, was editing and publishing a monthly ten-cent magazine called *Boys' Paper*. While still in short pants, he was interviewing and soliciting editorial contributions for his little magazine from the great and near-great of New York City. It was one of the friendships he formed in his editorial capacity that got him started on his voice collecting hobby.

The man was Charles Edison who, on hearing of Vincent's interest in gramophones and voices, invited the boy editor out to Menlo Park to meet his father. The elder Edison and Vincent talked about phonographs; the great inventor told about his early collection of famous voices, and Vincent told him that he wanted very much to make just such a collection himself. Edison, pleased with his youthful enthusiasm, presented him with a recording machine, a cumbersome affair with a horn into which the person being recorded shouted, while an operator worked a bellows to blow away the wax cut from the cylinder by the recording needle.

From then on, when young Vincent went to interview anyone, this machine went with him. The person involved was asked not only to contribute an article to *Boys' Paper*, but also to bellow some words of wisdom into the machine. With several friends and the recorder, he called at Teddy Roosevelt's Oyster Bay home, and it was then that the only recording of Roosevelt's voice was made.

Vincent, right, and his son, Kenneth, examine a replica of Edison's first recording machine at the scientist's laboratory at Menlo Park.

In the summer of 1916, after a year at Columbia University, Vincent decided that he would go to Europe and record the voices of such personages as Kitchener and Foch and, when victory belonged to the Allies, the captured Kaiser. Without money or the consent of his family, he stowed away on a boat, but without his precious recording machine. Arrested by Liverpool immigration authorities, he walked out of the hotel where they had confined him along with other suspicious characters and made his way to London. He earned a little money in London by carrying luggage at Victoria Station, then stowed away for France on a Channel boat.

Getting by the French immigration officers with some fast talking, he managed to talk his way into a French Army division as a dispatch-carrier. He was sixteen at the time. Wounded at Arras, he came out of unconsciousness to find himself in a military hospital in Calais, under arrest and charged with being a spy. It seemed that while he was unconscious, he had muttered a few words of schoolroom German.

Through the combined efforts of the American Ambassador and Secretary of State Lansing, he was released and sent home. In New York, he appeared in a musical comedy as a singer, and when the United States entered the war, he volunteered for the American Army. After seeing service with the A. E. F., he became an attache of the American Embassy, attending the Peace Conference as a code clerk. This last was a tantalizing job in that, without his recorder, he was in close proximity with such people as Joffre, Pershing, Foch and Poincare.

Arriving home in 1920 Vincent roamed about the country recording voices for a while, then went abroad again to conquer new fields. He obtained records made by the Kaiser, Hindenburg and Ludendorff from a Major von Stulpnagel. From a retired admiral, he secured a record made by Franz Joseph, in 1915; after this coup, he returned home.

In 1922 he went to work for Edison as a recording engineer, going out on location to record political talks as well as jazz bands. He stayed with Edison until 1928, when the recording company went out of existence. He worked for a small firm of sound engineers until 1935, and then went into business for himself.

One source of records for Vincent's collection is the re-recording business, at which job he is probably the world's expert. Many people have old cylinders or discs whose

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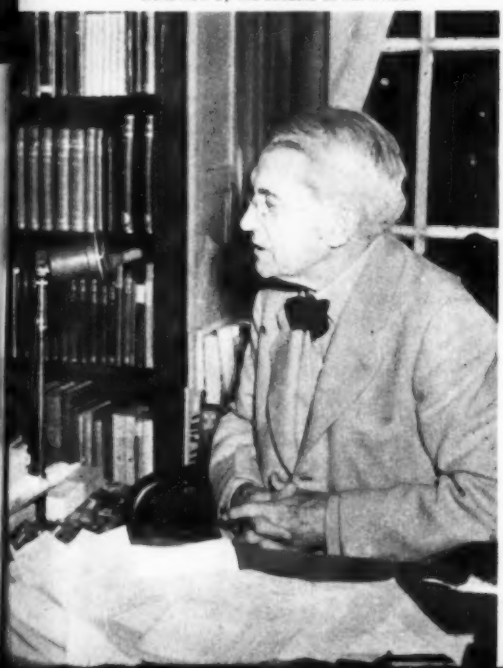
Prof. Phelps delivers his message, to be heard many years from now by the readers of his works.



If such deserts of wheat as this one become unprofitable, farmers *could* turn to another crop—drugs!

DRUGSTORE FARMERS

by Joseph Lawrence

Europe's war puts no crimp in the supply of medicines for America's sick. U. S. farmers fill the demand with home-grown drugs and chemicals!

LIKE a blast from a Polar ice cap, the wind roared across the barren Chinese plateau and almost swept the little expedition into oblivion. The American, cursing the day he'd ever set foot in China, and especially the travel folders that had led him to expect a land of sunshine, tea leaves and lotus blossoms, remained cheered with but one consolation—the Coolie guide assured him they were almost at their goal.

"Master! . . . wait. There!"

The Coolie pointed toward a shriveled plant that almost tore from its roots with every sweep of the chill wind. Shielding his face from the biting blasts, the American sank to his knees and began a minute examination of the stringy growth. Then, with a cry of anger, he was on his feet.

"You fool!" he shouted. "That isn't ephedra—we've come on another of your wild goose chases!"

But the native only grinned—and the American realized it was no use. The Chinese knew where the drug ephedra grew, but it was getting to be pretty obvious that they weren't planning to reveal their secret. For three long months now, they had pursued one false lead after another, but the American was no closer now than the day he stepped off the boat to obtaining what he sought—a seedling from the rare ephedra sinica plant.

An experimental drug farm, above. Dr. C. C. Albers, of the University of Texas, is shown tending his strange crop, while, below, Dr. Albers looks over his harvest.

The explorer—an agent of the Bureau of Plant Industry of the Department of Agriculture—decided there was nothing to do but turn around and go back. He would have another discouraging report for his coworkers back in the States, of course, but they were getting used to that by now. He had sent back nothing but discouraging reports ever since he had been sent into China.

"No wonder ephedra can be grown only in China," he muttered to himself, as the expedition began its weary return to civilization. "The Chinese are just clever enough to make sure no one else ever learns how to grow it."

It wouldn't be so bad, he thought, if it weren't for the Japanese situation. America had been able to get all the ephedra (the plant from which ephedrine, using for treating colds, other nasal disorders, and high blood pressure, was extracted) it wanted before the Japanese invasion. But, with the Japs occupying North China, where ephedra grew, exporting of the plant had simply ceased. It remained for America to grow its own ephedra—and that's what the government men were trying to do, provided they found a seed.

Back in Shanghai, the explorer decided to

Ready for the market, drugs may be in liquid form, fine powder, pill or raw, as shown above. The raw form is most common to farmers.

The American was about ready to pack up and go home. In fact, his ticket had been bought and passage arranged, when success suddenly came to him as he sat in his hotel.

An American missionary, having heard of his quest, came to him and, with the greatest of secrecy, placed before him ten little brown grains.

They were ephedra sinica seeds!

"Shh! Don't talk!" the missionary cautioned. "Your battle is only just beginning. There is now an embargo on ephedra, and you will not be permitted to take these out of China. I would advise you to write a letter to your family, then seal these seeds between your letter and another sheet of paper. It may possibly succeed."

And in a flash, the man was gone! No word had he uttered as to how to cultivate the seeds. He left no information regarding planting, soil, irrigation, harvesting or possible ravages

try a new tack and contact some of the missionaries. It was just possible that some of the religious orders had been able to learn the secret of ephedra without being able to use it or thinking it was worth passing along. But it was no go—the missionaries had heard of the plant and knew of the mystery surrounding it—but that was all. They couldn't begin to tell where it grew.

Dr. Albers weighs a belladonna crop, below, then puts it through a meat grinder.

Dr. Albers' classroom is full of boxes, such as those above, in which students try growing various drugs.

which might beset the little brown pellets before they could be planted in the Dakota farmlands, where they were destined to be cultivated by the Extension Service of the University of South Dakota. It was just "here are your ephedra seeds!"—and that was that.

Yet, from those ten little grains has come the entire present day crop of ephedra grown in the United States. The smuggling out of frozen North China of those seeds has insured this country a quantity of ephedrine enough to supply its every need, and it has scored one more point for the theorists who claim that many of the drugs which we commonly import can be grown just as well right on domestic soil.

Although scientists have worked for years on the problem of growing imported drugs domestically, it has been World War II that has given the greatest impetus to the plan. The possibility of getting rich in a hurry has prompted many farmers to take up the growing of drug crops instead of the staples, wheat, corn, potatoes, etc., and the fact that there is in the United States almost every conceivable kind of soil and climatic condition has spurred other agriculturists to consider the plan.

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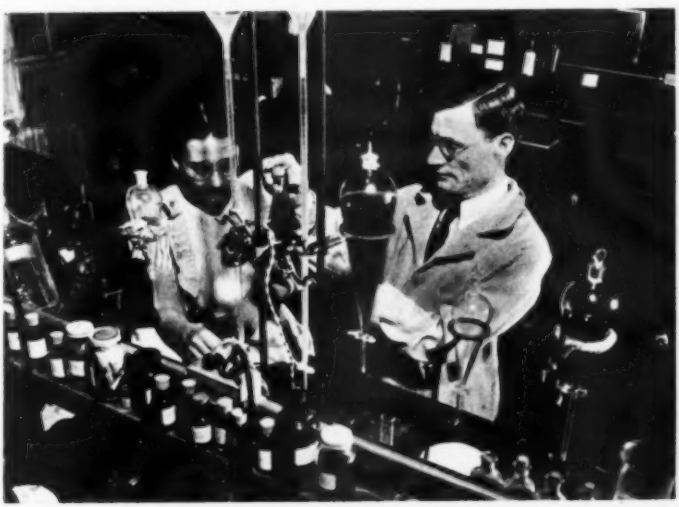


The final step in drug production, left. Dr. Albers distills his products to make them fit for the nation's prescriptions.

Don't do it, driver! If you have a Tachograph in the truck it'll tell the boss.

Tacky The Tattle-Tale

"FOR Pete's sake, Bill, can't you crawl 'round that truck? We're late for the game now," growled Hank.

Bill was chauffering himself and four fellow basketball players to a game. He stepped on the gas and side-swiped the truck. Henry was injured.

"In order to get around that truck, we had to step her up to sixty-five miles an hour." That's the story the boys told. Fear of chastisement has caused many an exaggeration. But in court, when Hank's father sued, it was the word of five against one truck driver. It looked like a mean damage suit — heavy penalty for driver and the company for which he worked.

Now, it so happened, the driver's boss had consented to testing out a new instrument called the "Tachograph," which is cousin-in-law to the wise monkey. It knows all, writes down all . . . then *tells* all! For the evening and time of the pre-basketball game accident it recorded thirty-five miles an hour. Result, no damages collected.

Another driver, John, transporting automobiles out of Detroit, was held up for repairs. His company had human spotters out to check on their drivers. One spotter didn't like John. When John rolled in at his terminal an hour and a half late, the spotter reported John had not been held up for repairs, but that he had stopped for a gay time at such-and-such a tavern. John lost his job. His union went to bat for him; they knew John was speaking the truth because his Tachograph chart showed the layover had been made forty-two miles up the road from the tavern named, verifying John's statement. John

Here's the face of the Tachograph. It measures four by five inches, and is two inches deep.

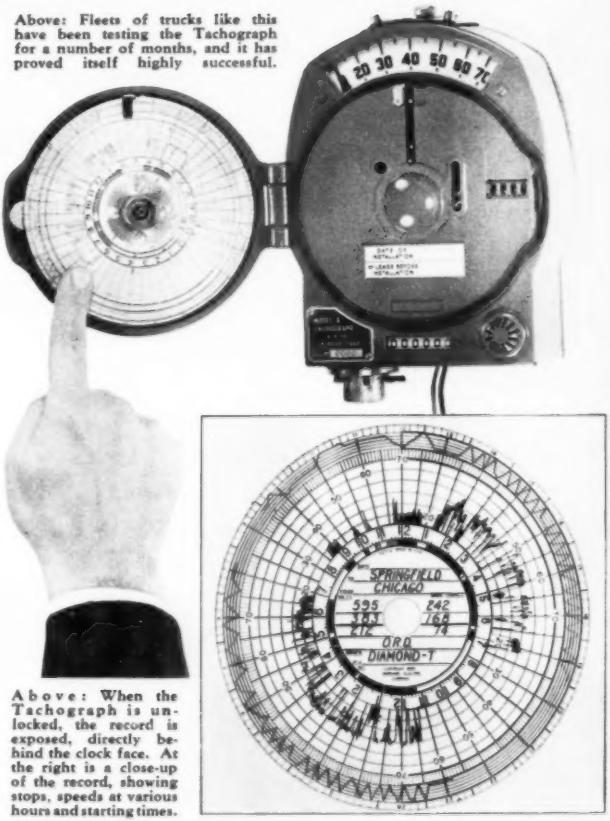
Above: Fleets of trucks like this have been testing the Tachograph for a number of months, and it has proved itself highly successful.

was reinstated; the spotter was fired.

A certain fleet of trucks operating between Chicago and Minneapolis varied from eleven to fourteen hours in making the trip. Why? Tachograph discovered that the lunch hour of drivers varied accordingly; furthermore, some drivers kept their engines idling through lunch . . . while the boss's gas and oil fiddled away.

Yes, this instrument is both "tattle-tale" and friend in deed.

A wholesale drug house knew their men were on the road too long. But why? Distances were not great. One driver complained some of the stores to which they delivered were indifferent about giving him help while unloading goods. Different trucks were assigned to the stores of which he complained. The Tachograph on each verified his statement. Also this wise instrument showed the trucks were being routed over streets with too many stop lights. Trucks were re-routed; stores were asked for more unloading cooperation. The problem was solved.



Above: When the Tachograph is unlocked, the record is exposed, directly behind the clock face. At the right is a close-up of the record, showing stops, speeds at various hours and starting times.

For months, now, the Tachograph has been on trial on about six hundred trucks. Some have been in operation under the severest of conditions for 100,000 miles without mechanical adjustment. At last the company, whose engineers perfected this ingenious instrument, are satisfied to put it on the market.

Before it was put out on testing trucks, the factory laboratories placed their instrument under the severest conditions. In a testing rack, for the equivalent of 100,000 miles, it was exposed to temperatures varying from 20 degrees below zero to one hundred and eighty above, Fahrenheit. It was tested for dust storms; for jolts, by subjecting it to

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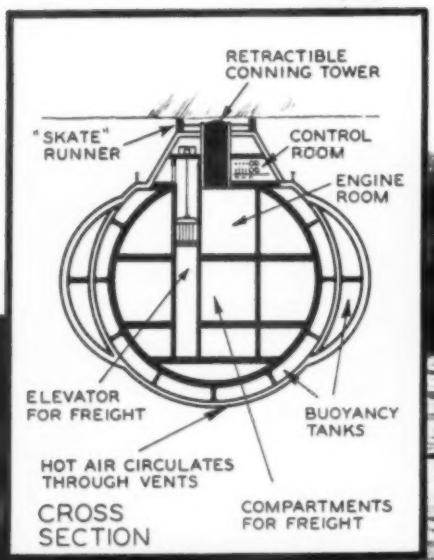
LIFELINE UNDER P

The British are planning great cargo submarines to navigate under the North Pole and polar ice-cap, escaping enemy raiders in a new lifeline!



ER POLAR SEAS!

by
Carl Cronin

GREAT BRITAIN, faced with a steadily rising rate of shipping losses in the Atlantic, has plans for a sensational new type of cargo-carrying submarine designed to *cruise under the North Pole!*

Fantastic at first blush, the plan has two obvious advantages: 1. A trade route under the polar ice cap would dodge the worst present concentrations of enemy raiders in the Atlantic; 2. A route by way of the North Pole would actually shorten Britain's lifeline to Australia, New Zealand and India by from 1,000 to 3,000 miles.

Reports leaking through the censorship from London do not state clearly whether work has actually begun on such a submarine, but do clearly indicate that specific plans for a fleet of polar submarines are at hand.

Due to troubled conditions in the Mediterranean, Britain was forced to abandon her Suez trade route many months ago. This forced the British lifeline to

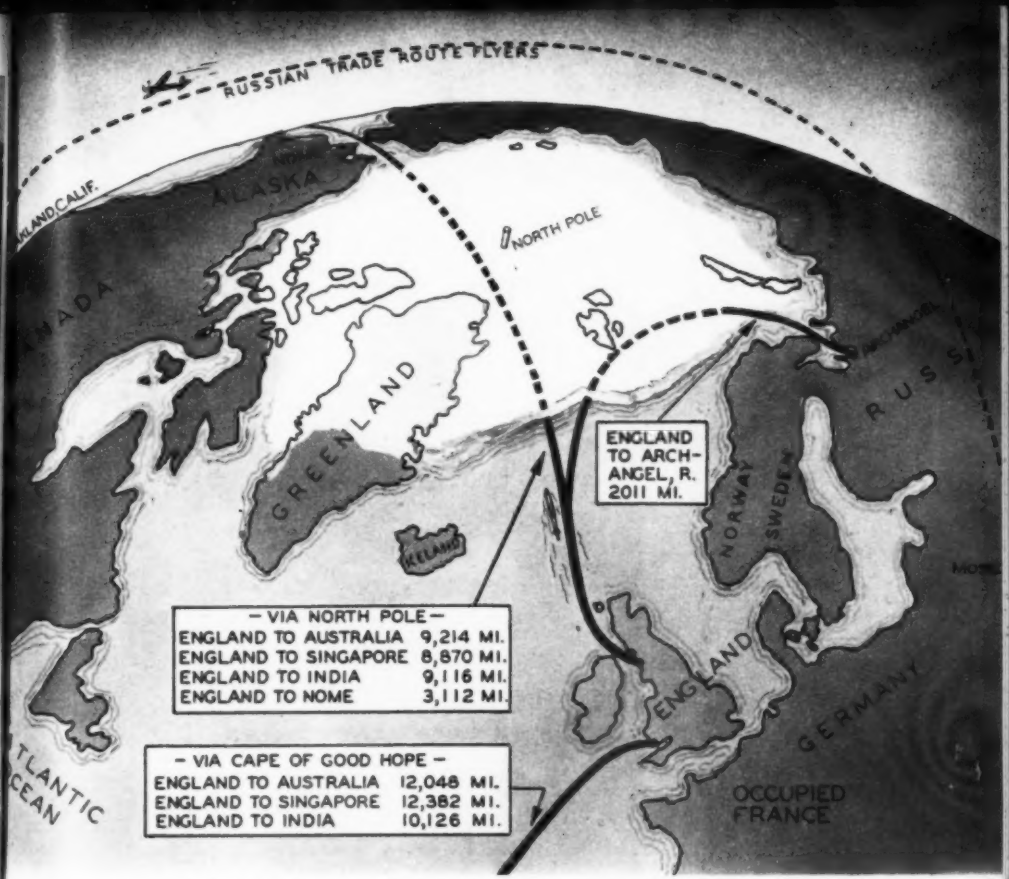
The British have obtained invaluable data for their new super-submersibles from the lessons learned by Sir Hubert Wilkins (above) in his cruise in the ill-fated *Nautilus* (shown at the right). Wilkins tried the North Pole trip but failed.

The Russians long ago recognized the fact that a route by way of the North Pole would cut distances in world trade. In 1937, the three Russian flyers shown in the photograph below flew from Moscow over the North Pole to Oakland, California.

extend down the coast of Africa and around the Cape of Good Hope to Britain's possessions in the south Pacific and Indian seas.

Singapore, for instance, is 12,382 miles from the British Isles by way of Capetown. A route cutting from Glasgow straight across the top of the globe, through the Bering Strait and down the Pacific ocean, is only 8,870 miles to Singapore—a saving of 3,512 miles! Similarly, lesser savings are made to Australia, India and New Zealand.

Nazi submarines and air raiders have been taking an increasingly disastrous toll of British shipping as the war continues. The annual rate of loss, based on sinkings in April and May of this year, is in excess of 6,000,000 tons



This map, drawn by Staff Artist Reynold C. Anderson, shows graphically the great distances which would be saved by a submarine trade route under the polar ice cap. The saving from England to Singapore, "Fortress of the East": 3,512 miles!

British shipbuilding capacity in 1939—before bombing of ports and shipbuilding facilities had seriously begun—was estimated at only 1,382,420 tons a year. With the British losing ships at the rate of 6,000,000 tons a year and replacing them at less than 1,500,000 tons annually, it is obvious they will be forced to resort to some other means of transport soon—even though U. S. aid is given them.

Reports from London give the high-light details of the proposed polar submarines. They will approach the size of the greatest cargo-carrying merchant ships of today. Since submarines must surface at least one a day to run their diesels and recharge their batteries, they will be equipped with retractile ice-cutting hatches and ventilator tubes, capable of cutting through 100 to 125 feet of ice to the air. The submarines will have radio depth sounding equipment, with beams directed downward and also forward. The forward beams will warn against submerged ice walls. Navigation apparatus will rely on radio triangulation upon known shore wireless stations, to eliminate the necessity of shooting the sun or stars, in case of long submerged runs.

Besides being heavily insulated against polar cold, the outer walls of the submarine will be heated by hot-air blasts to insure against the danger of the underwater ships being frozen in while on the surface in open water recharging.

Most explorers agree that there are no great land masses at the North Pole, such as are found at the South Pole, and that, consequently, there will be little difficulty in finding a direct open water passage under the ice cap.

The best guess of experts in America is that the British plan to operate a "shuttle" system between Nome, Alaska, and some North Scottish port with their cargo submarines. Cargoes could be transferred at Nome to reg-

A close-up of the ice-cutter hatch on the British polar submarine is shown in the above sketch by Staff Artist Anderson. This hatch, together with ventilator shafts, are retractile. Spinning cutting edges knife through 100 feet of polar ice.

ular merchant ships to complete the journey to the Pacific and Indian ocean possessions. In this manner, maximum use of the polar submarines would be insured.

Distance of the route from Glasgow to Nome is calculated at 3,112 miles and the route could probably be traveled in approximately 15 days. This is only slightly longer than the route from Southampton to New York.

During the greater part of the year, the polar seas have great stretches of open water at more or less regular intervals, according to the reports of explorers. Even during the most severe weather, these areas are not frozen to a depth of more than 20 feet. It would be a simple matter for such a super-submarine to surface its hatches and ventilating tubes through ice of this nature and recharge.

Vilhjalmur Stefannson, famous Arctic explorer, predicted nearly 15 years ago that the polar route would be used by submarines eventually.

"In 10 to 20 years, I am confident we will see improved submarines making regular trips under the polar ice," he said at that time. "The polar ice is from four to 20 feet thick in most places and the maximum thickness of the ice pack is not more than 120 feet. By actual freezing, the ice is never more than 70 feet thick at any place. The grinding of the floes causes it to pile up in some places.

"However, if a submarine were to navigate at a depth of 150 feet it would be quite safe and it would not strike any snags of ice. Icebergs might be encountered in the regions of Spitzbergen or Greenland, but in those districts the submarine would be traveling on the surface and could avoid bergs in the same way that other ships do.

"There is a current flowing from the Bering Strait toward England, and a disabled sub very likely would be washed under the ice to open water and safety in time."

Since Stefannson spoke those words, great

[*Continued on page* 142]

The Toughest Game In The World

THERE has always been a lot of controversy concerning what the roughest sport is, with lacrosse, water polo, football and several others being nominated by various partisans. However, in Argentina, the Gauchos play a modified version of a game which wins top honors in daring and danger without any question.

This game is called "El Pato," which in English means "the duck," and is derived from the duck-shaped bag which was used when the game was originated in the Argentine at the beginning of the 19th century. The original version of the game was so rough and so many Gauchos were killed or maimed that the Argentine Government banned the sport in 1822 and again in 1840. This ban was so rigid that those killed while playing "El Pato" were refused a Christian burial. In this "game," the Gauchos would meet some five miles

[*Continued on page* 134]

Above: Two players of one side swoop down on the man from the other side who has the ball, with no holds barred!

Right: Leaning far off his mount, a player scores a goal. Below: The player in front is trying to head off the opposing player who is about to catch a pass from a team-mate.

Secret Agents Of The Skies

Richard E. Nebel of W2DBQ-WLNB, Brooklyn, New York, stokes up with a pot of tea after a 50-hour stretch of handling emergency messages in the 1937 Mississippi Valley floods. Nebel is Amateur Emergency Corps co-ordinator for New York City and Long Island.

by David Robinson George

"HEIL, Hitler!"

Spelled out in crisp International Morse, this alien phrase startled Government and amateur radio operators alike throughout the Middle West one day last May. "Jamming" the frequency of a Naval short wave station, the mysterious signal demanded: "What is the speed of the secret new Grumman F3F-5? Answer or get off the air!"

And signing no call letters, the anonymous operator repeated instead: "Heil, Hitler!"

A few seconds later, the high frequency channels hummed with activity. From more than a score of "ham" stations, messages went out to W1AW, the headquarters station of the American Radio Relay League in West Hartford, Connecticut, reporting interception of an illegal transmission. From more than a dozen field monitoring stations and three of the seven fixed listening posts of the Federal Communications Commission, similar reports went by radio and wire to the commission's offices at Washington.

From W1AW, a general call went out:

"QST . . . QST . . . All amateurs attention. Illegal transmission intercepted on 6990 kilocycles. FCC asks vigilance for further signals. Make all reports direct to FCC, Washington."

Less than half an hour later, when the mysterious sender again came on the air, the receivers of the 200 official A. R. R. L. observers and thousands of other amateurs were tuned to the frequency as their operators copied down every word. Meanwhile, at the fixed and mobile monitoring stations of the FCC, Government operators swung their direction-finding beam antennas until the anonymous transmission pounded in at maximum strength, carefully recording the compass reading.

Vigilantes of the ether, America's great army of amateur radio operators is ever on the alert for alien and illegal operators, as well as being prepared for any national emergency.

Right: If bombs or shells leveled these two great towers of New York's WEAF, the nation's radio amateurs would take over commercial communications for the area.

Then, as mysteriously as it had come on the air, the signal ceased for 24 hours. On the following day, at approximately the same time as the first broadcast, it began again.

"Beware, Americans!" the caller warned. But at this point, the Morse symbols no longer spelled out recognizable English words. "LXCWPYF TFGQILK XFZMUWP . . ."

Now, the mysterious sender had violated another FCC regulation—the statute prohibiting amateurs from using secret codes or ciphers. And as the violator continued the unintelligible string of letters, the FCC agents closed in on him. Proceeding in motor trucks in the general direction of the signal, determined from the graph on which were plotted the bearings of several stations taken the previous day, the Government men drew nearer. As the signal increased in strength, they varied the direction of the movable antennas on their trucks to narrow down their search.

At last, in a respectable neighborhood of Peoria, Illinois, three FCC trucks rolled up from different directions in front of an old-fashioned, two-story frame house. Conferring briefly, the Government agents found themselves in agreement —the illegal signal was issuing from that building.

At the door of the house, they were met by an elderly woman

Below: Army operators on emergency duty in the Mississippi Valley during the 1937 floods, when they co-operated with radio amateurs in keeping up communications with the outside world.

who, although frightened when they produced their credentials, allowed them to enter.

"Is there a radio station in this house?" demanded the spokesman.

"Nein," she replied, shrugging, and then pointing to the stairway, added: "Mein son . . ."

Mounting the stairs, the agents walked down the second floor hall to a small bedroom, where an astonishing sight met their eyes. Bending over a short-wave receiver sat a slim, fair-haired youth, his right hand on a semi-automatic telegraph key. Beside him, reaching from the floor almost to the ceiling, was a powerful, one-kilowatt short-wave transmitter.

Regular contact with the Byrd expedition was kept by Frank Fennimore over this amateur radio station, W3HFD, Carroll Park, Penn. The station is prepared to serve similarly in a national emergency.

Startled, the youth stood upright, glaring at the officers through thick-lensed spectacles.

"What do you want?" he demanded.

"We want to know who you are and what you're doing," the spokesman said. "We're from the Federal Communications Commission."

The young man paled, obviously shaken, but kept up his hostility. "It's none of your business," he snapped.

"We'll see about that, lad," said the chief officer as he grasped the youth's arm. "You're coming with us to Springfield for questioning."

And while two of the officers remained to dismantle the illegal transmitter, confiscating its tubes and other vital parts for evidence, the chief officer led the young man away.

At the Springfield district offices of the FCC, the prisoner steadfastly insisted that he had no connection with a foreign government. Born in this country of German parentage, he admitted he had Nazi sympathies. A brilliant scholar and an ardent radio fan, he also was interested in ciphers.

When long questioning failed to reveal a coherent reason for the youth's conduct, Government authorities waived the usual charges, which carry a penalty of six months imprisonment or $5,000 fine, and instead, had him committed for mental observation.

Capture of this offender should

Left: Marshall H. Ensor, winner of the 1940 Paley Award as the radio amateur who had contributed most to the American people, is shown with some of his pupils whom he assisted in becoming licensed radio amateurs through lessons given at his station, W9BSP, at Olathe, Kansas.

Handling emergency messages is right down the alley of Matthew L. Bergen, former ship radio operator, seen here at the "mike" of his amateur station, W3JAR, Moorestown, N. J.

serve as a warning to all spies and enemies of this Government that the FCC and the nation's "hams" are combing the air night and day for would-be Fifth Columnists.

Restricted by the FCC from contacting foreign stations and from using portable transmitters except for emergency tests for the duration of the world crisis, the 58,000 American radio amateurs also are checking closely on each other to see that these regulations are strictly observed.

A New Jersey amateur recently sent out a CQ—a general inquiry call expressing willingness to talk with any station which might answer — and heard a foreign amateur calling him in reply. Heedful of the FCC ban, the American operator did not answer the foreigner, but sent out another CQ instead. Nevertheless, the following morning, A. R. R. L. headquarters received half a dozen reports from its observers stating that the foreign station had been heard calling the Jersey "ham." The whole incident probably did not take more than a few minutes, and yet not one, but several observers were shown to be on the job.

But vigilance for subversive or illegal signals is not the only activity of American amateurs in the interests of national defense. Throughout the nation, more than 10,000 "hams" have organized the Amateur

[*Continued on page* 140]

Right: Combing the air for "Fifth Columnists" is one of the self-imposed defense activities of American radio amateurs. Among the "hams" on the alert for alien signals is E. W. Braddock, shown here at the key of his station, W3BAY, Haddonfield, N. J.

Krick, The Weather Merchant

by Tyche Ayres

He has pioneered a revolutionary kind of weather forecasting: one that helps win football games—and may win the war!

A THIRTY-FOUR-YEAR-OLD ex-concert pianist may be the man who will beat Hitler.

And he may do it with nothing more lethal than a weather forecast.

His name is Irving Krick. Besides being a concert pianist, he once was a radio announcer and for a brief period was a brokerage salesman—until 1929 hit him.

Today, still only 34 years old, he has revolutionized the science of weather forecasting, forced the United States Weather Bureau to reorganize completely its theories and practice—and, on top of it all, become a success story, himself, right out of Horatio Alger.

Back in September, 1939, the British General Staff guffawed when a would-be warlord named Adolf Hitler launched his first actual military campaign, into Poland. The British military experts congratulated each other and the world in general. Hitler and his mechanized army, they announced, would be

Dr. Irving P. Krick, shown at the left, is the wizard of a new method of long distance weather forecasting. Hundreds of diverse uses have been found for the unique service which he sells. Even football coaches buy it, to learn whether there will be a sloppy field when Old Siwash meets its pigskin foe.

Disastrous drouth and dust storms that hit the nation's bread-basket in the '30's could have been foreseen by the new forecasting system.

Krick long-range predictions are based on observations taken in the upper atmosphere by meteorographs such as the one at the left. They are sent 15 miles into the air on balloons. Below, two Minnesota hunters found frozen to death in a sudden blizzard that took 102 lives in the northwest. General use of long range forecasts would avert many such disasters.

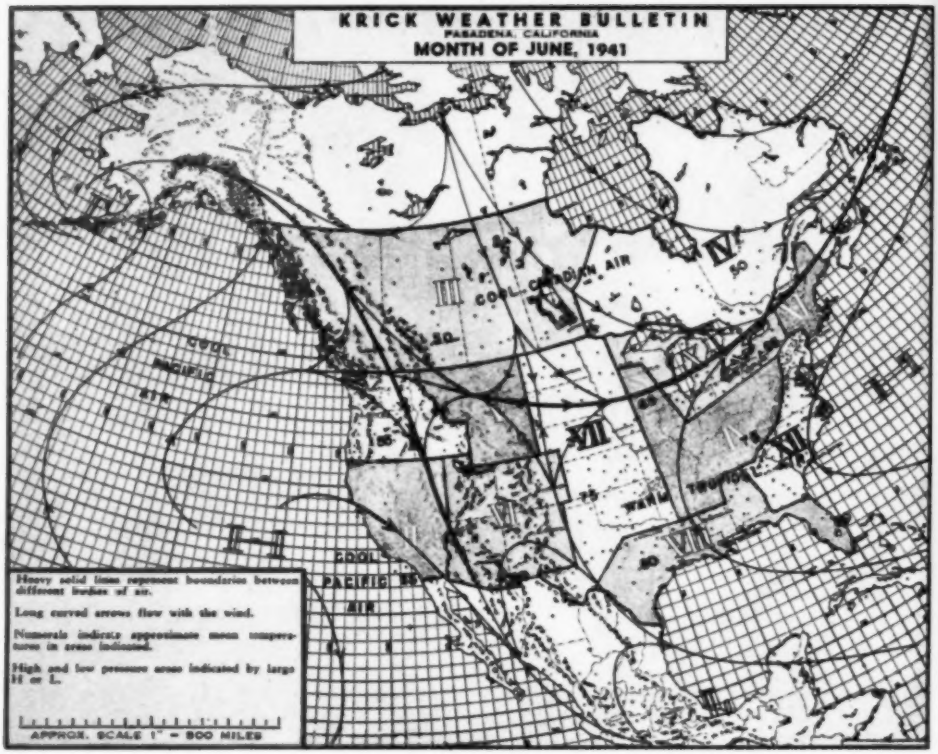
whipped by "Old General Mud." The annual rains were due in Poland, and the German tanks would bog down in Polish mires.

It didn't rain.

The Allies were slightly more apprehensive when the Nazi war machine struck across the Low Countries in May, 1940. But still, they argued, spring in France is the rainy season and no mechanical army can operate without air support, and air support is not feasible when it rains. Hence, they concluded, the Maginot Line undoubtedly would hold.

It didn't rain.

In the spring of this year, the British went to the support of the Greeks. The Nazis, they knew, were poised in Roumania and Bulgaria for a thrust through the Balkan mountains toward Thermopolae. But the


KRICK WEATHER BULLETIN
PASADENA, CALIFORNIA
MONTH OF JUNE, 1941
COOL CANADIAN AIR
COOL PACIFIC AIR
WARM TROPICAL
COOL PACIFIC AIR
Heavy solid lines represent boundaries between different bodies of air.
Long curved arrows flow with the wind.
Numerals indicate approximate mean temperatures in areas indicated.
High and low pressure areas indicated by large H or L.
APPROX. SCALE 1" = 800 MILES

Differing from the U. S. Weather Bureau maps, which show only surface observations, the Krick weather map shows the position of polar and tropical air masses and movements of sub-stratospheric air currents. Left, sleet storms play havoc with power and communication lines, but Krick advance warnings enable companies to have repair crews on the spot.

rainy season was on in the Balkans and no tanks could possibly drive through the treacherous mountain passes while it was raining.

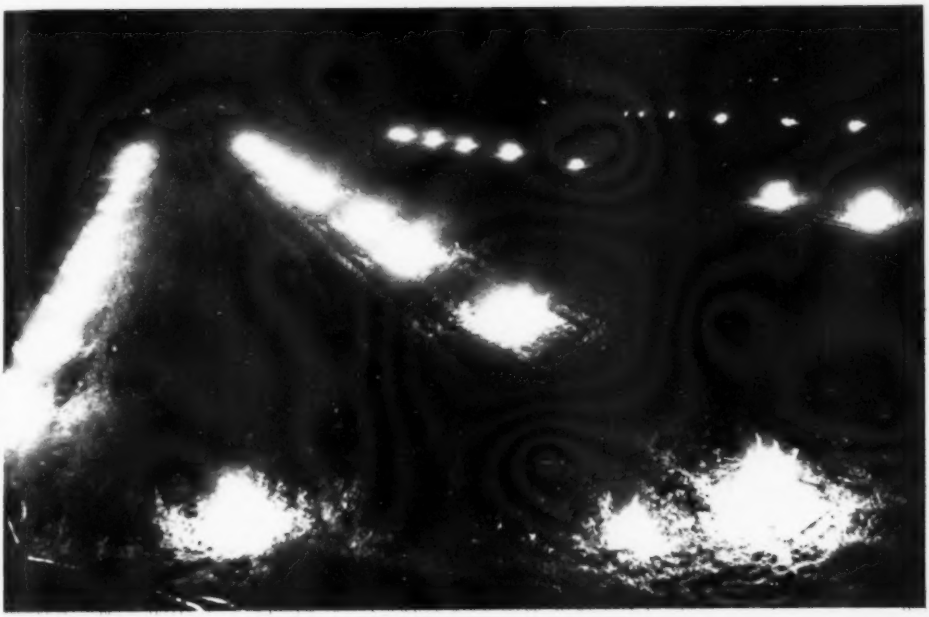
It stopped raining.

There has been a great deal of talk about "Hitler's weather luck." There have even been suggestions that Hitler consults an astrologer before each lightning stroke.

Dr. Irving Krick can tell you otherwise. The fact of the matter is that Hitler consults a meteorologist, a Herr Bauer, whom Dr. Krick knows.

Herr Bauer is an exponent of the revolutionary new system of long range weather forecasting known as the "air mass analysis" method. That system enables Herr Bauer to make amazingly accurate long range weather predictions.

Here, then, is the greatest secret of Hitler's success to date. He has waited patiently be-



Smudge fires make the night eerie in orange groves as Florida growers fight frost. Below, Chicago's Wheat Pit, where traders take Krick's service to learn of rains or drouth which will affect grain price fluctuations.

fore each campaign until Herr Bauer has been able to tell him that a three- or four-week period of clear weather, during which the *Luftwaffe* could operate successfully, was coming up. All of Hitler's victories at this writing have been completely dependent upon control of the air. And the air-borne invasion of Crete, for instance, could never have been successful had an unexpected period of "ceiling zero" weather grounded the invading planes and gliders.

Hitler hasn't had any weather luck. Hitler, in every instance, has *known!*

And that is where Dr. Irving Krick comes in.

For Herr Bauer, Hitler's advisor, is undoubtedly good at air mass analysis. But America, in Dr. Irving Krick, has the world's foremost master of this new art of weather prediction.

In the event of an American campaign against Hitler, the only thing that would beat a good weather man would be a better weather man. Irving Krick is that! As such, he may become one of America's greatest assets.

Already, Dr. Krick, with his new system of weather forecasting, has saved America literally hundreds of millions of dollars.

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A Ray Gun For Buck Rogers!

Here's one "death ray" that is receiving serious consideration from the Army and the Navy. It kills rabbits at four hundred yards and more!

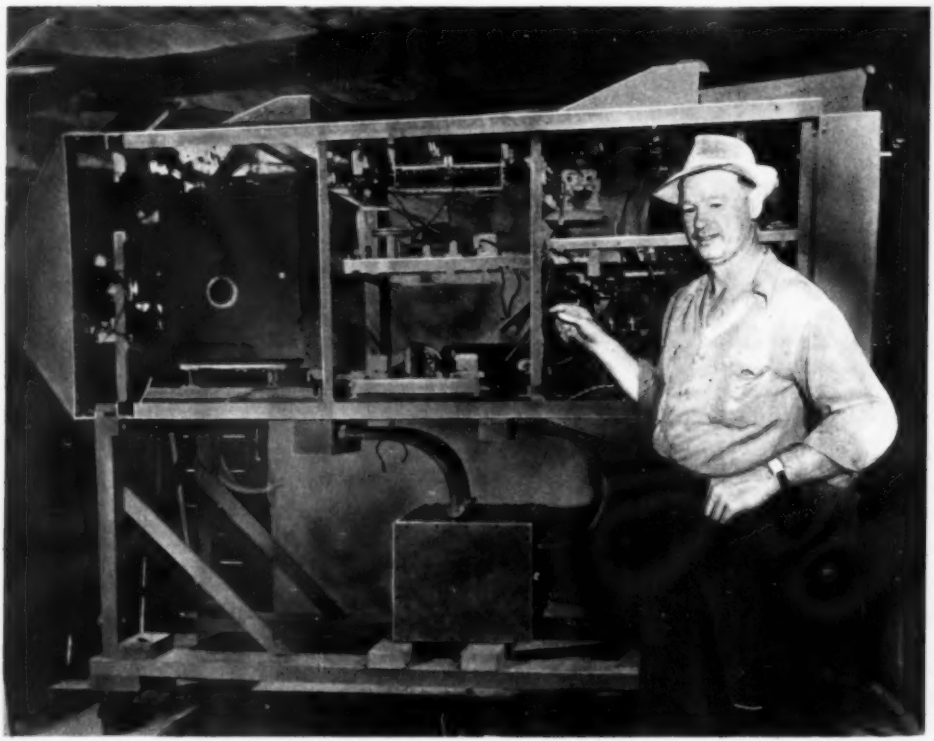
CLAIMED to be the first "death ray machine" ever actually to work, an invention of a California scientist, Lawrence E. Riley, of Burbank, is being given final secret tests by Army and Navy experts.

The mysterious electronic ray has killed rabbits at a distance of 400 yards, according to reports of observers. A physician acting as representative of the California State Medical Bureau witnessed a demonstration of the ray machine and gave an affidavit testifying that the ray has killed rabbits at long distance.

The ray, according to the physician's testimony, left no outward sign of scar or wound, but cooked the rabbit's flesh thoroughly. Rabbits were killed so fast that they did not close their eyes before death overtook them. They appeared to be rooted to the spot, the report said.

More than 100 rabbits have been killed by the ray in demonstrations, and Riley says the machine has killed sheep at a distance of 200 yards.

Riley, who is 39 years old, is married and has four children. He has made numerous trips to Washington and conferred with Army and Navy officials concerning the ray gun, and they have advised him against taking out patents, in order that the mechanism may be



This is the only photograph ever taken of Lawrence A. Riley's new "death ray" machine—and it was taken by Riley's private bodyguard, since the location of Riley's laboratory is a deep secret, known only to Army officials, the bodyguard and Riley.

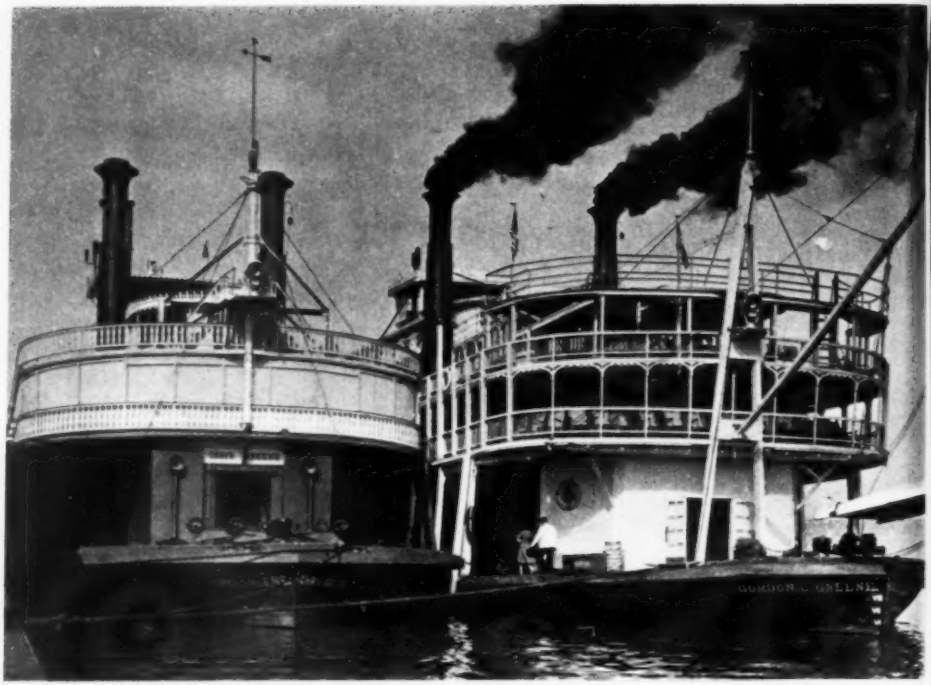
The rabbits shown above are fed well, just like human prisoners in the "death house"—for any meal may be their last. Riley has killed more than 100 of them. Right, Riley is shown in his laboratory.

kept secret. Riley started experimenting in 1926 and patented several improvements in the field of television. He owned a radio shop in Los Angeles and operated an amateur radio station.

It was not until November, 1935, that he realized he had hit on something more important than television. One day, while he was working on an electronic ray model, he accidentally directed his ray machine toward a sheet of metal. The metal became "blue hot" and, instead of melting, crystalized.

Riley raised some money to finance his research. Soon after he had started work, several attempts were made to steal his working plans and his model.

[*Continued on page* 146]



Beating the record of the *Robert E. Lee!* Two modern river boats ready to sail from Cincinnati.

Steamboat Bill Rides Again

Romance rules the river again as steamboating comes back with a bang to the Old Mississippi and its tributaries.

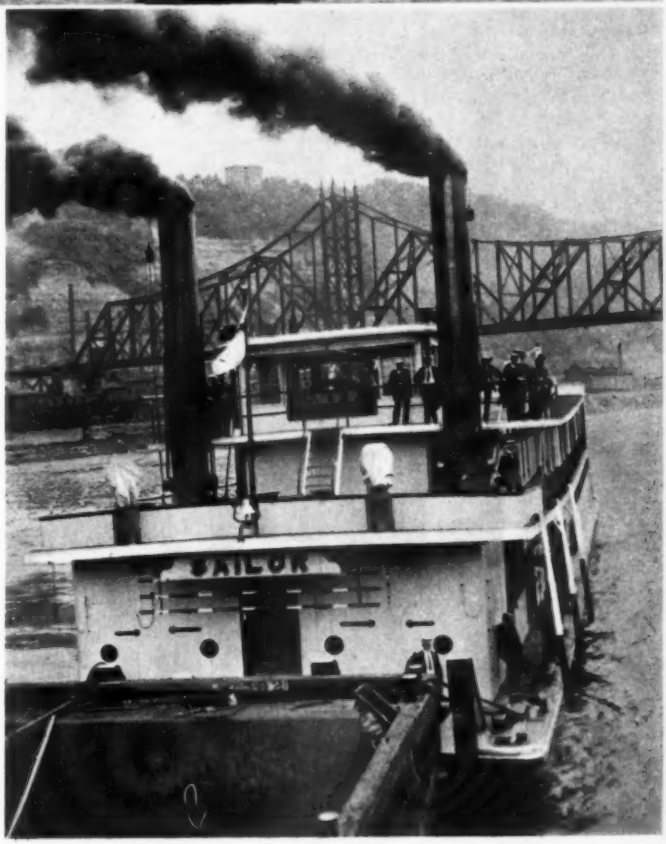
by Captain James Poole

SHADES of Cameo Kirby! The old Mississippi, which with its sister rivers, the Ohio and the Missouri, had just about given up its claim to being the romantic stream the movies said it was, is coming back into its own! Though cargo boats have never ceased chugging up and down between Chicago and New Orleans, the last few years have seen a tremendous revival in riverboat commerce, and the war in Europe has served to step up both passenger and commercial traffic to such a degree that veteran rivermen are blinking their peepers in uncontrolled wonder. It wouldn't surprise the old sternwheel jockeys to see the days of the plantation, the mint julep and the stove-pipe hat revived in all their glory.

"What we are doing today is railroading on the rivers," one sternwheel skipper told me recently in explaining the increase in cargo traffic. "It isn't steamboating—not by a blamed sight. We work on schedule now, with regular sailings, prompt delivery and everything business-like—just like the railroads do."

And, with railroad freight cars a decided scarcity these days because of their being pressed into carrying defense cargos, the use of the flat-bottomed river barges to handle the bulk of the ordinary midland commerce has increased steadily.

Visitors to Pittsburgh, Cincinnati, Louisville, St. Paul, St. Louis and New Orleans are struck by the changes that have taken



An "arrowhead" formation of present-day Mississippi barges is shown above, while, at right, a "tow boat" starts its freight on the run to New Orleans.

place along the river-front in the past 20 years.

Just after the World War, steamboating almost had disappeared from these inland waters. The railroads had grabbed off the bulk of the freight hauling, wharves rotted into complete disuse, the once - cocky steamers decayed at their piers, and the river had begun to assume a deserted appearance. Now, things are humming again, and have been for the past few years. There are modern freight terminals in all the key cities, smart, diesel - burning tow boats swish back and forth, and the dock-sides have taken on a look of decided prosperity.

But that's not all. Just as the tow boats came along to take over the

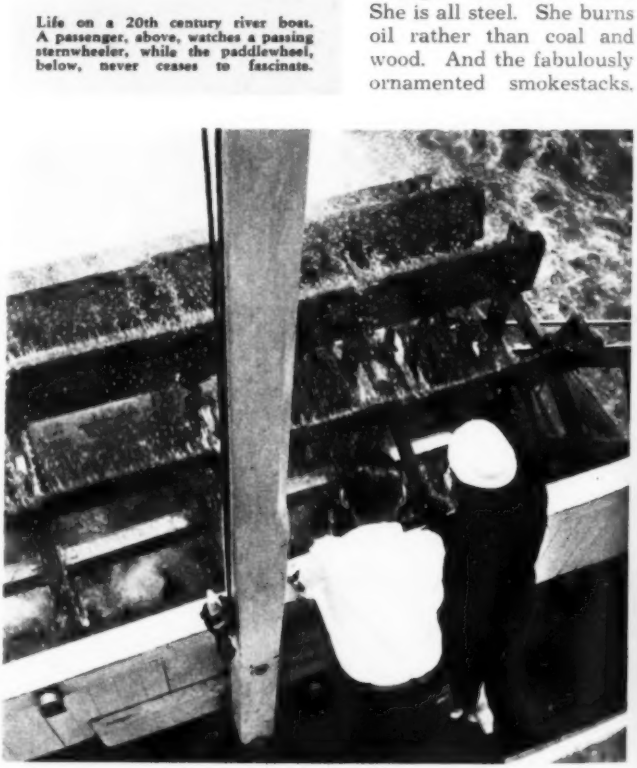
Life on a 20th century river boat. A passenger, above, watches a passing sternwheeler, while the paddlewheel, below, never ceases to fascinate.

business formerly discharged by such romantic and famous old sternwheelers as the *Robert E. Lee*, the passenger boats also began polishing up their brass and shoving out into the stream. Various companies discovered there was considerable fan interest in riding the old river boats, and tours—complete with the trimmings that made a ride on the *Robert E. Lee* a genuine adventure—were arranged. And when the Battle of the Atlantic put a stop to junkets abroad, the thousands of vacationists whose summer wouldn't be complete without a cruise began heading for Pittsburgh and Cincinnati.

Insofar as passenger traffic is concerned, it's the old Mississippi again, suh, and, if no one is looking, you can stand topsides, puff on your cigar and imagine yourself to be a rich planter, bound down to N'Orleans to dispose of a shipment of cotton. But, the commercial picture is somewhat different. Romance is out, as far as the tow boats go, and the accent is all on speed, efficiency and modernization.

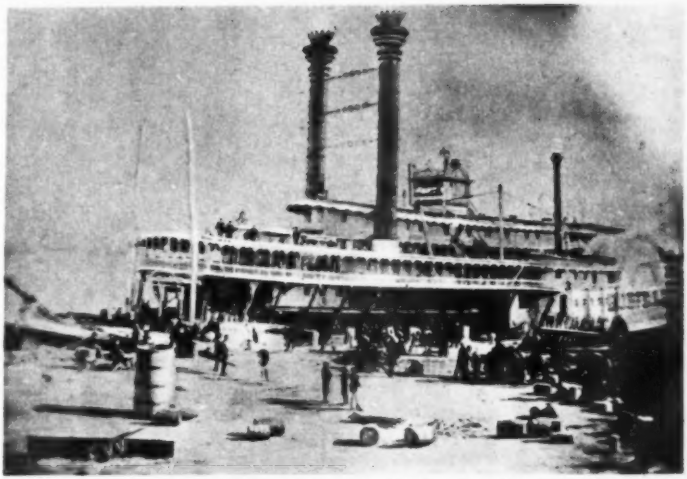
In the old days, the ships were trim, airy, light-footed and high stepping. They went skimming over the rivers bearing passengers and freight, and their majestic reputations—manifest in such famous bottoms as the *Prairie Belle*, the *Kate Adams* and the *J. M. White*—were enough to make an Ozark schoolboy throw away his slate and leave home.

The modern Mississippi cargo craft is something else again. She is built for strength and endurance. She is all steel. She burns oil rather than coal and wood. And the fabulously ornamented smokestacks,



gleaming white decks, fancy cabins and flapping sidewheels are conspicuous by their absence.

Take the *Mark Twain*, for example. A splendid type of tow boat (despite their designation of "tow boat," the modern Mississippi cargo steamers don't actually tow barges, but push them), the *Twain* is 200 feet long, draws only five feet of water, has a horsepower of 1,000 and weighs 476 tons. She carries no passengers, except an occasional guest of the captain who then occupies one of the officers' cabins.



The famous *Robert E. Lee* herself! This famous "floating palace" was once Queen of the Mississippi, but both her speed and cargo records are broken by today's packets.

But the modern river steamboat is the last word in efficiency. She can take down the river in barges more freight than an old time boat three times her size. A barge 300 feet in length, with a cargo capacity of 3,000 tons, is average for these modern river packets, and their cargoes of tractors, beer barrels, dry goods, hardware and general merchandise attest to the fact that, while the gay old days of the "floating palaces" may be gone forever, the romance of modern industry still hovers over the Father of Waters.

The passenger boats are something else again. Rather than attempt to cut away from the glory of the past in a welter of twentieth-century efficiency, the modern river pleasure steamers do all they can to cloak their cruises in an atmosphere of Victorian theatricalism. Their twin-stacked packets belch forth black smoke—to the delight of the poetic ones aboard!—banjos perform at time-and-a-half, darkies grind out "Ole Man River" and the general set-up is calculated to fill the hearts of the passengers with a feeling of being just like Mark Twain. At the same time, all the comforts of a modern cruise are provided—dance bands, shuffleboard, bingo, horse-

[*Continued on page* 149]

Homeward bound! Today's steamboat passengers, left, are a far cry from those of the Mark Twain days.

You're RIGHT — That's WRONG

Here are 25 statements, some of them true, the others false. The trick is to separate the *true* statements from the *false* ones—and it isn't as easy as it looks! Use a pen or pencil and check the correct box under each statement and see how you make out! After you've given yourself the test, try it out on friends and other members of the family and compare scores. They'll enjoy it and so will you.

Are you ready? Let's go!

1. Rhode Island has the longest name of any state in the Union.
   True ☐ False ☐

2. A cryptogam is a form of cipher writing.
   True ☐ False ☐

3. Vanilla flavoring comes from orchids.
   True ☐ False ☐

4. A stack of ten silver dollars is exactly one inch high.
   True ☐ False ☐

5. If you have an "appetite like a bird," you are a small eater.
   True ☐ False ☐

6. Illyricum is an ingredient in toothpaste.
   True ☐ False ☐

7. Bali pigs wear roller skates under their stomachs to keep them from dragging on the ground.
   True ☐ False ☐

8. A blacksmith sprinkles water on his fire to make it hotter.
   True ☐ False ☐

9. A blue surface illuminated with yellow light appears green.
   True ☐ False ☐

10. The eelpout is called the "lawyer fish" because of its ugly and slippery appearance.
    True ☐ False ☐

11. "ASPCA" is a musicians' organization which has been fighting the broadcasting chains.
    True ☐ False ☐

12. Vinegar may be substituted for hypo solution in photography.
    True ☐ False ☐

13. A bee has four wings.
    True ☐ False ☐

14. Kentucky Wonders is the name of a popular brand of cigarettes.
    True ☐ False ☐

15. A hair's breadth is equal to 1/48th of an inch.
    True ☐ False ☐

16. Black rust forms in hot water pipes as the result of high mineral content of some types of water.
    True ☐ False ☐

17. A bat is a night-flying bird.
    True ☐ False ☐

18. A plot of land described as "the NE¼ of the NE¼ of the NE¼ of Section 12" would be equal to ten acres.
    True ☐ False ☐

19. Nome, Alaska, is closer to London than Miami, Fla.
    True ☐ False ☐

20. The real father of John Barrymore was Herbert Blythe.
    True ☐ False ☐

21. The leg wrappings worn by soldiers in World War I were called ruttees.
    True ☐ False ☐

22. In Broadway lingo, a person with a broken heart is said to be "carrying the torque."
    True ☐ False ☐

23. "Flat," "cape," "roundnose," "diamond-pointed," and "half-round" are terms used to describe different types of wrenches.
    True ☐ False ☐

24. Mercator's projection is one of the newest methods of showing motion picture film.
    True ☐ False ☐

25. The pitch of a propellor is the distance forward it travels in one revolution.
    True ☐ False ☐

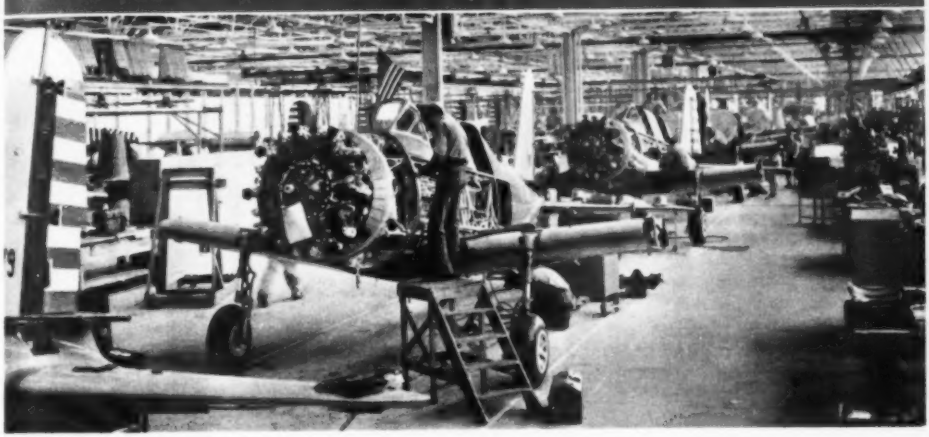
WHAT'S YOUR SCORE?

To get your score simply give yourself 4 points for every question you answer correctly and total the result. If your mark is above 90, you are exceptional; if it is between 80 and 90, you deserve high praise; if it's between 70 and 80, you're good; between 60 and 70, fair; and below 60—well, try again next month!

Answers will be found on page 155

NEWS OF SCIENCE AND MECHANICS

PLANE PRODUCTION LINE
AIRGRAPH MAIL SERVICE
NEW ARMY STOVE
BARRAGE BALLOONS
FOR U. S. DEFENSE

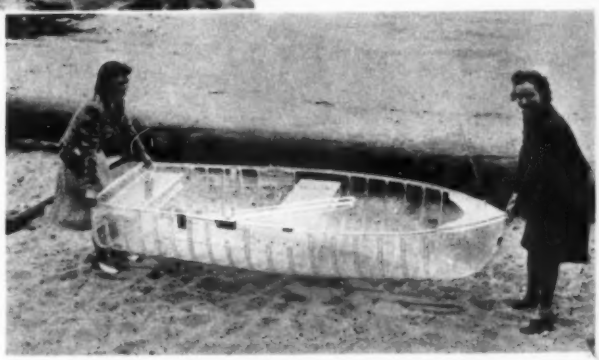


First Plane Production Line

THE first conveyor system in the airplane industry, using the same assembly line methods developed by automobile manufacturers, has been put into operation at the Vultee Aircraft plant in Glendale, Calif. Photo shows the wings and motors line. Vultee expects to quadruple output in this manner.

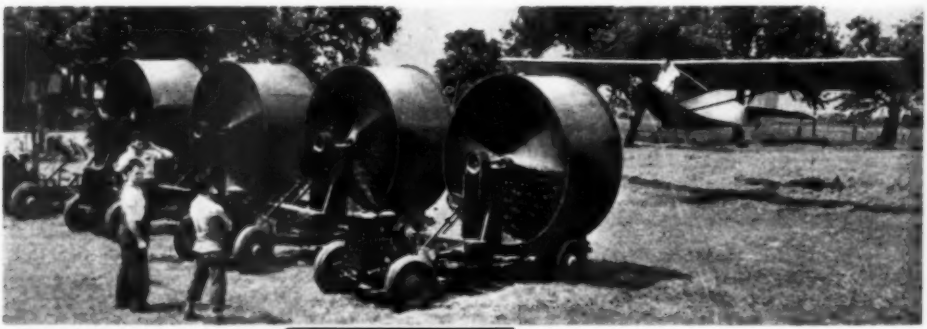
Meet The X-ray Skiff

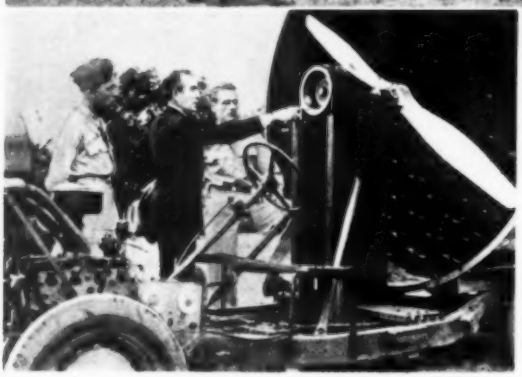
NOW the fish can see who's trying to hook him! A rowboat made entirely of the new transparent plastic known as Lucite is displayed at Port Washington, L. I., by its originator, Clemens Scheuer. The boat is very light in weight, and deterioration-proof.



Looks Like Baby's Bath!

NO, THESE happy sprites aren't Mama's children frolicking in their bath! Their wearing a new type of life-saving suit developed by the Norwegian Government and which they're testing in New York harbor. Complete, even to a hood, the suit is said to be completely waterproof and expected to keep the body of a sailor thrown into the sea warm and dry. The test was run by the Norwegian Shipping & Trade Commission.





Wind Made To Order

IN ORDER to give glider students instruction without risk of injury, the Lewis School of Aeronautics, at Lockport, Ill., uses these wind machines to simulate actual flying conditions. Equipped with Ford V-8 motors and 7-foot propellers, the machines, invented by Comm. Eugene McDonald, shown at left pointing at the propeller shaft, create a 45-m.p.h. gale. Comm. McDonald is president of the Zenith Radio Corp.

R.A.F. Pilots Train With Model Ships

IN BETWEEN raids on Germany and occupied France, R.A.F. pilots go on a busman's holiday and fly model planes of their own design. Not only does this hobby give them needed recreation, but it sharpens up their flying technique for work in the clouds with their Spitfires. In addition to designing their own ships, the R.A.F. pilots also do the complete job of building them.

Electric Eye Tells How High Is Up

HERE'S one judge at a track meet who won't be accused of favoritism toward a prospective record-breaker! The electric eye, shown here, was developed by the General Electric Company and given its first try-out at an interscholastic track meet in Schnectady. Designed to measure accurately the height reached by jumpers, the device was a complete success.

The Army Gets The Range

A NEW stove, designed to replace the conical-shaped Sibley tent stove which was used by soldiers in the first World War, has been acquired by the U.S. Army. Collapsible, the new burner—here being demonstrated by a soldier in New York—can be used with either wood or coal and, from its looks, should warm the heart—as well as the feet and biscuits—of our new army.

Music That Lays An Egg

POULTRYMAN CHARLES H. LEE, of Ramona, Calif., has a new wrinkle in egg production. He finds his chicks will turn out more eggs if they are lulled into activity with a little music. Accordingly, he has equipped his barnyard with radios. Mr. Lee says that music—and even a political speech!—will tend to quiet the fryers and get them in the mood for egg-laying.

President Roosevelt Shows His Models

A FEW of the many ship models in the collection of President Roosevelt are shown in the above photo, taken in the new library of the Roosevelt home at Hyde Park, N. Y. The models cover every phase of this hobby of the Chief Magistrate, and their excellent quality would gladden the heart of a model fan. Also in the new library, which was dedicated by the President on June 30, are letters, documents and numerous other gifts which FDR has acquired.

Handy For Housewives

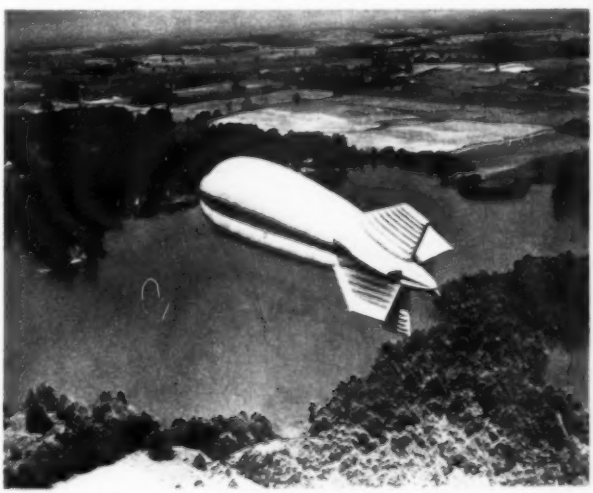
THIS, we hope, is the last picture of a soldier in a gas mask we shall have to show you for a long time. Actually, this isn't a gas mask—it's a dust mask. It's being worn by an army man on maneuvers in Tennessee to protect his nostrils against the gentle clouds of earth kicked up by the stalwart marching ahead of him.

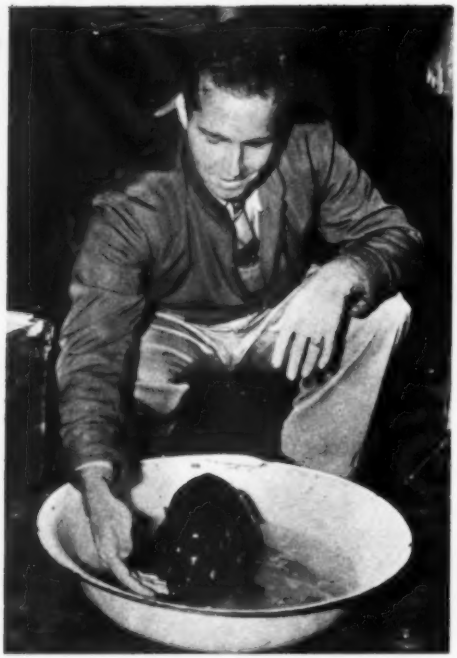
Another Time Capsule

A REPLICA of the Westinghouse Time Capsule, which was loaded with 20th Century memorabilia and buried in the silt at the New York World's Fair, is opened at the Hayden Planetarium in New York. It will enable non-Fair-goers to see what was put into the capsule for the edfication of the folks who dig it up in the year 6939.

Balloons To Battle Sky Raiders

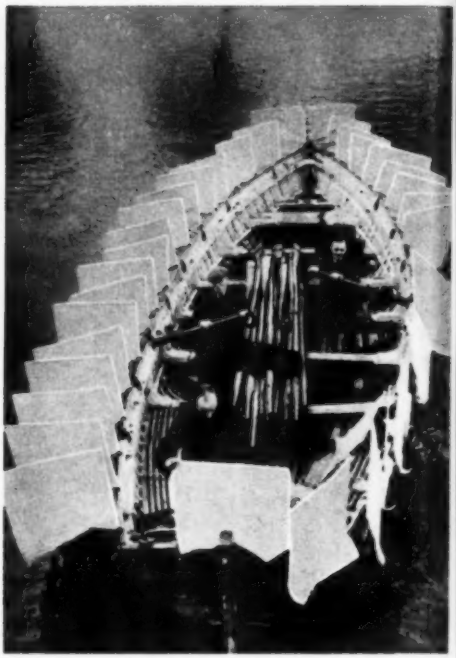
ONE way to beat off an air-raid is with the use of barrage balloons, and, in that respect, the United States is determined not to be caught napping. The government has ordered 3,000 of these balloons for use in key cities on the mainland, in Hawaii, and in the Canal Zone. One type of balloon tested by Army and Navy officials is shown above. Six-lobed, it can reach a height of 15,000 ft., as compared with the 5,000 ft. obtained by those now in use in England.





No, It's Not A Bullfrog

IT'S a hippopotamus. Weighing but seven pounds, this two-months-old pigmy hippo arrived in New York recently aboard the *S. S. West Kebar,* from Liberia. Silas E. Johnston, who obtained the tiny creature from Liberian natives, is shown giving it a bath. When full grown, the little chap will weigh around 400 pounds.

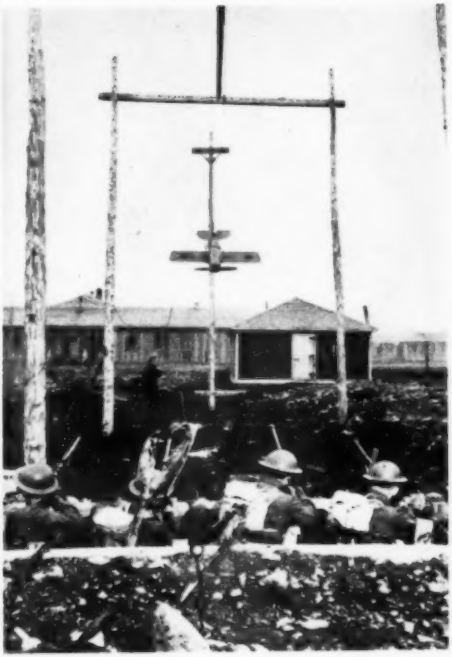


Fire Screens Act As Sails

THIS ingenious device has been adopted by British shipping firms to protect crews of tankers, who frequently find their life boats surrounded by a sea of flames after their ships have been torpedoed. The asbestos shields can be used as shields against flames if the sea is covered with burning oil, or as sails, when opened, as shown.

Army Scout Car Takes To Water

THE "Aqua-Cheetah," invented by Roger W. Hofheins of Buffalo, N. Y., is shown leaving the Niagara River after a recent test by Army officials as a scout car. Powered by a regular auto motor, it is capable of doing more than sixty miles an hour on land, and handles in the water much like a small motorboat. The tests were said to have been highly successful. Its speed when being used in the water is a little more than eight miles an hour.



Dive Bomber Defense

THESE Canadian soldiers are practicing defense against dive bombers at Camp Debert, in Nova Scotia. The small plane is dragged to the top of the pole in the background, from where it is automatically released to swoop down realistically toward the riflemen. The plane is well riddled after two or three "dives."

Invents Electric Bike

BIRGER VIGERSTROEM, well-known Swedish engineer, is shown here with the electric bicycle which he invented and which is now being used through Sweden. Capable of a speed of about twenty-five miles an hour, the electric bike costs around $190. The machine weighs a little less than 200 pounds and is battery-powered.

Making It Tough For The Caddy

GOLF caddies will be a good deal less than enthusiastic over this device if the expression on this one's face is any indication. Otherwise, the gadget is said to be just what the doctor ordered for people suffering from arthritis and rheumatism, who want to play golf and yet have been ordered not to do too much exercising. Just tee off, climb on, and let the caddy lug you down the fairway! "Chariot races" may be held between holes.

Mobile X-Ray For The Army

DEMONSTRATED here is one of the new portable X-ray and fluoroscope units which are now being delivered to army hospitals. The compact new apparatus, developed after two years' study at the Army Medical Center, breaks down into nine units, each weighing less than 200 pounds. The units can be packed into special trunks, permitting complete portability.

For A Happier Landing

SAFER and more economical landing of airplanes is foreseen as a result of the device invented by Charles H. Roberts, of Burbank, California. When huge ships land at 85 miles an hour with their wheels stationary, as at present, there is a terrific jar to both wheels and planes. Robert's invention sets airplane wheels spinning at whatever speed will gear them to the speed of the plane.

A Powder Puff For Uncle Sam

THIS striking picture was taken at Fort Tilden, New York, and shows one of the huge 16-inch guns that guard New York harbor a second after firing. The huge gun shot its one ton projectile at an 18-foot target being towed by a tug 25,000 yards out in the Atlantic Ocean. Two of these 16-inch guns fired fourteen rounds during a half hour of shelling. It was the first time the guns had been fired in a year, but the layoff didn't seem to bother their performance.

The Compleat Angler

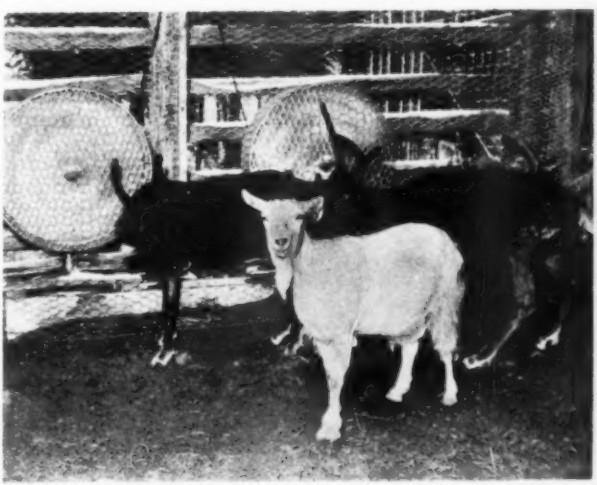
CHARLEY SEAMAN, Cleveland sportsman and former railroad signal inspector, tries one of his many fishing rods as he stands in his room surrounded by tackle boxes, outboard motors, spinners, plugs, flies, minnow buckets, and other fishing gadgets. He's been collecting fishing tackle for more than 15 years and now has about 20,000 pieces valued at some $12,500.

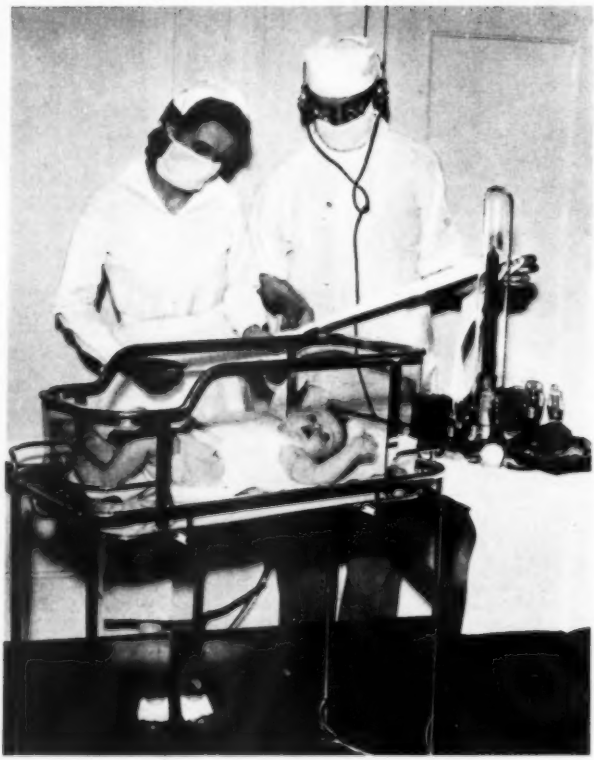
A Prize-Winning Smile

GENE DIORIO, of Brooklyn, New York, who won first prize in the MECHANIX ILLUSTRATED "Words-Within-Words" Contest, looks mighty pleased with his reward—a Taylorcraft Trainer. Gene didn't know how to fly, but when these lines appear he will be well on his way toward his first solo flight—in his own plane! It's a great life. If you don't think so, ask Gene Diorio!

Goat And Reindeer Thrive On Fanfare

VENTILATING fans have a lot of uses, but here's a new one for the books! Dr. Philip Cole, of Lake Placid, N. Y., has a hobby of raising goats and reindeer. Black flies became troublesome, especially for the reindeer, and Dr. Cole noted a stiff breeze brought the animals relief. Unwilling to bank on the weather, he installed two ventilating fans in a shed near the barnyard and now the animals have a stiff breeze at all times. The reindeer seem to be hogging the wind.





"Airgraph" Letter Service For Soldiers

SPEEDING up of homeward bound mail from British troops in the Middle East is being accomplished by means of a photographic letter service. The sender writes his message on a special form which is photographed on miniature film. On arrival at destination an enlargement is made.

Lighting Way To Fame

BABIES kept in transparent bassinets are less likely to become neurotic later in life, scientists have recently decided. Tests made in Chicago with delicate recording instruments show that babies able to see all around them do not develop an "anxiety complex." This permits them to grow up with clear minds and thus increases their chances of success in life.

CRAFTS AND HOBBIES

PHOTOGRAPHY
MODELS • BOATS
THE WORKSHOP
HOW-TO-BUILD

Close-ups By Reflection!

PHOTOGRAPHY

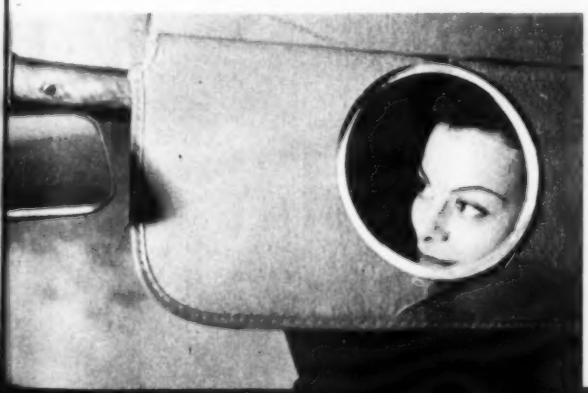
by Roy Lester

PERSPECTIVE distortion and your camera's minimum focusing distance (it may vary from 3 feet to 10) can be an awful bugaboo when you're working in close quarters. Just try taking a picture of the girl friend sitting beside you in the car after a long drive, for example. You're both too lazy to get out and take a picture in the conventional way but there she is, lovely as life, and you've just got to make the picture.

In a spot like this, your car mirror, or better still a larger mirror from a make-up compact can be a god-send. For, by shooting your pretty subject's reflection in the mirror you can more than double the effective working

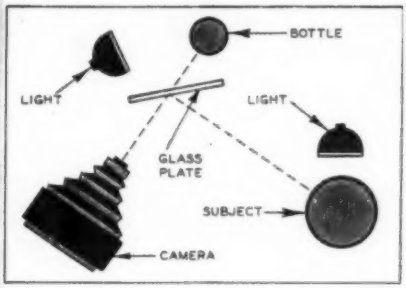
[*Continued on page* 158]

The car too cramped for picture making? Why not shoot the young lady beside you through the car mirror—or better still through a round make-up mirror? Illustration at top shows how it's done. The result, at the right.



Bottled Portraits

by Serge Balkin



Left: Outline showing arrangement of lights and props needed to produce "bottled portrait" shown at far left.

MANY photographic tricks require elaborate equipment and an intricate knowledge of photographic techniques on the part of the trickster. However, the stunt of making bottled portraits of people or other subjects needs nothing else than a bottle and a sheet of clear plate glass.

The trick is begun by focusing the camera lens on a bottle. Now, stand the sheet of glass upright between the camera and the bottle, and turn the glass at an angle as in the diagram. Pose the subject to be "entombed" in the bottle on the same side of the plate glass as the camera but in such a position that his image will be reflected into the camera lens (and finder) by the glass sheet. The subject will be properly reflected only when an imaginary line from the object forms the same angle with the glass plate as does an imaginary line from the camera lens. (The angle of incidence equals the angle of reflection.)

When a picture is made with a setup of this kind, both the bottle beyond the plate glass and the image of the person reflected into the lens by the glass plate will be reproduced on the film. The glass will not be apparent as long as light does not strike it. Dark backgrounds

[*Continued on page* 156]

Left: A variation of the bottled portrait effect. This modification affords greater control. A cut out portrait head is substituted for a living subject on the camera-side of the plate glass "mirror." It is pasted up on a dark background and then illuminated as in the illustration below. Be sure the lamp image isn't reflected into the lens too.

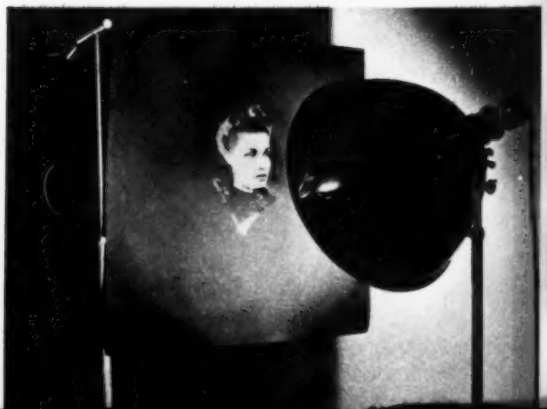


PHOTO CONTEST

FIRST PRIZE ($10.00): "The American Way" by Chas. R. Knight, 754 Ave. B, S.W., Winter Haven, Calif. 3 min. at f/11 on Super XX in DK-20. SECOND PRIZE ($5.00): "The Pelican" by H. A. Kharas, 37 B. J. Road, Bandra, Bombay, 20, India. Baldex camera, 1/100 sec. THIRD PRIZE ($4.00): "Down on the Farm" by John C. Woshner, 1514 Carson Street, Pittsburgh, Pa. 1 min. at f/22 on Super XX; 100-watt bulb in spot. FOURTH PRIZE ($3.00): "Spring School Daze" by B. T. Smith, Route 1, Tahoka, Texas. Montage made with 620 Vigilant camera on Super XX; outdoor exposure, f/16 at 1/50; indoor shot f/4.5 at 1/10th.

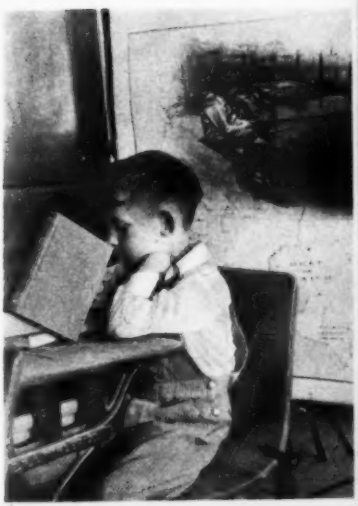
Submit contest prints unmounted—no larger than 8x10 inches. With each print, list your camera, film, lens opening and shutter speed, illumination, and developer. Write your full NAME and ADDRESS on the back of each print and wrap securely with cardboard or corrugated stiffeners. If you want unused prints returned, please enclose return postage. (Published prints are not returned.) Address: Photography Editor MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.

1st PRIZE

3rd PRIZE

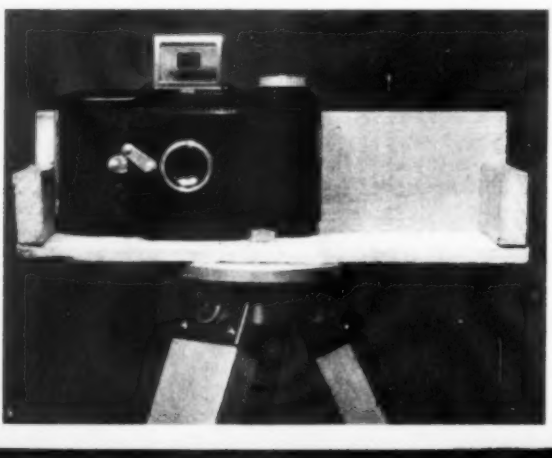
2nd PRIZE

4th PRIZE



Three-Dimensional Color!

FIGURE A (above): A two-camera stereoscopic setup in use. The box containing the cameras is fastened to the top of the tripod with a small nut inset into its bottom and then glued fast. The tripod screw engages this nut. FIGURE B (below): A stereoscopic shooting setup using only one camera. The box is three inches longer than the camera. The latter makes two pictures of each scene, one from each end of the box.



ANY amateur who makes 35mm. Kodachrome or Dufaycolor transparencies can, with little trouble and at slight expense, make pairs of stereo slides and a device for viewing them in their natural, three-dimensional aspects.

A pair of slides having stereoscopic quality can be secured by photographing the same scene twice from viewpoints about three inches apart—the average spacing between human eyes. There are two methods for making these slides. One makes use of a single camera which must be displaced three inches between exposures, and which obviously can be used only for still-life and stationary scenes. The second system employs a pair of cameras whose lenses are spaced three inches apart when the setup is completed.

Figure A illustrates the two-camera assembly used by the writer. Note that a pair of inexpensive cameras are used and that they are bound together tightly and supported on a sturdy tripod. It is essential that the cameras be held rigid so that their lenses are in exactly the same plane. Otherwise, they will not photograph the same scene and the three dimensional effect will be lost.

A sturdy, wooden box was used to hold the two cameras. It had to be a bit shallower than the thickness of the cameras employed and one of its sides had to be cut out to make room for the camera view finder. Six strong rubber bands served to hold the cameras in the box securely.

To insure perfect alignment of the two camera lenses, it is advisable to make test exposures on black and white film.

Small bits of wood may be pasted into either half of the box to make sure that the pair of cameras are always seated with their lenses on the same line when the cameras are inserted for use. One view finder

by
Jack Wright

Here's an inexpensive way to make and view miniature stereo color transparencies.

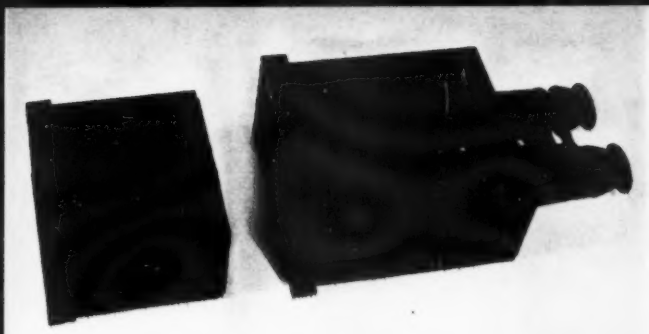


FIGURE C (right top): Component parts of the stereo viewer. It includes two telescoping boxes, and a pair of discarded field glasses. FIGURE D (right): The completed viewer with a cardboard slide holder in place in the furthermost sliding box.

does for both cameras.

With the double-camera setup, it will be necessary to release both shutters simultaneously. This may seem a little tricky at first but it will work out after a little practice. Obviously, this permits subjects that are not absolutely stationary to be photographed. The use of more expensive cameras with faster shutters may permit action subjects to be stopped by this type of stereo shooting setup but some device for synchronizing the release of both shutters at the same time will be necessary.

Many amateurs will desire to make stereoscopic slides with one camera and this is very easily accomplished. The simplest and cheapest way is to fasten, on top of a tripod, a small box in which the camera can move back and forth (Figure B). This box should consist of a bottom, back and two ends, as shown, and should be three inches longer, in its inside dimensions, than the length of the camera. It is fastened to the top of the tripod with a small nut, which may be obtained at a hardware store and which has the same thread as the tripod screw.

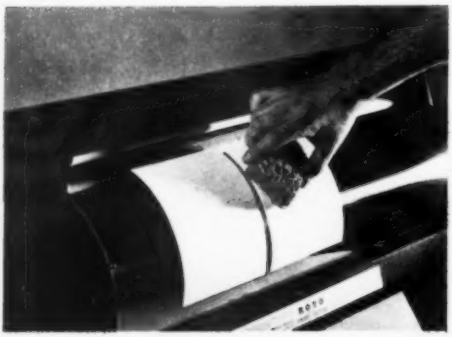
In using this box to take stereoscopic slides, the camera is placed firmly against the back and left end of the box. The scene is viewed through the view finder and sharply focused. One exposure is then made and the film advanced to the next frame.

FIGURE E (above): The completed stereoscopic viewer, in use. The movable telescoping box is adjustable for the vision of different people using it.

The camera is then moved to the other end of the box, held firmly against the back and right end, and a second exposure made. After

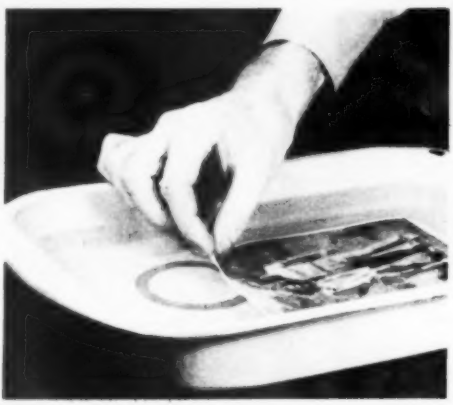
[*Continued on page* 147]

Darkroom Short Cuts



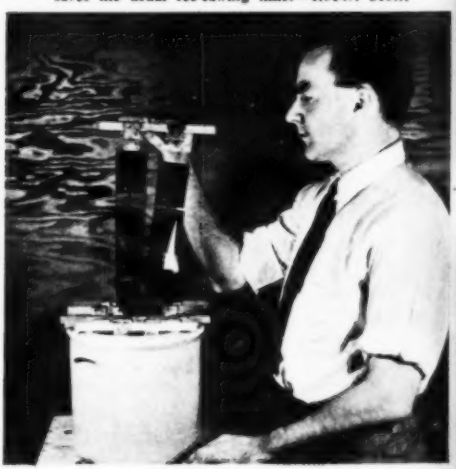
Left: Hasten drying of glossy prints by swabbing their backs with an absorbent cellulose sponge after prints are squeegeed on to either flat or rotary drying tins.—*Kenneth Murray.*

Below: Speed up the emptying of large, but small-necked solution containers by rotating the bottle or jug in a horizontal plane after inverting it. This creates a whirlpool action permitting air to rise into the bottle and thereby force out the solution in a steady unobstructed stream.—*Louis Hochman.*



Left: Keep large, single-weight prints from sticking to the bottom of the developing tray by placing a couple of rubber jar-sealing rings on the bottom of the tray.—*William Swallow.*

Below: Tray-developed cut or rollfilm may be fixed by suspension in a three-gallon crock full of acid hypo. Both ends of the rollfilm are attached to a stick laid across the top of the crock as shown. Lift and drain the film from time to time. The crock costs less than a deep tank and the system saves the usual see-sawing time.—*Robert Scott.*



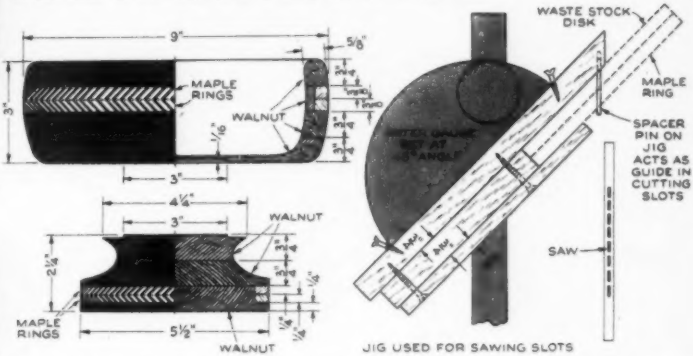
Above: Instead of fastening a piece of red tissue paper to the end of your penlight with rubber bands, for darkroom purposes, prepare the handy, removable "safety" cap illustrated. First, make a cardboard tube fitting snugly over the business end of the penlight. Then, glue or cement red tissue paper or cellophane over the free end.—*L. H.*

TURNED FRUIT BOWL

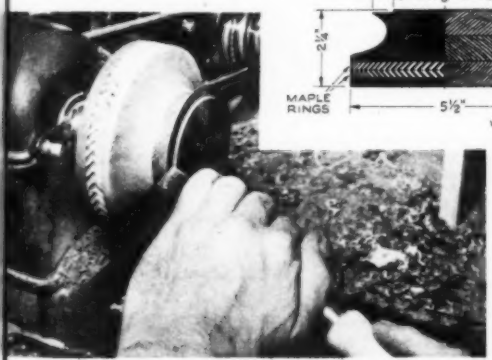
has inlaid design

Above: The maple ring mounted on waste stock disc is slotted on saw with aid of the jig. Below: Turning the base on a lathe. Raised center disc fits recess under bowl.

Above: Finished bowl and base showing inlay details. Right: This is the way bowl is used for decoration.



Above: Dimensioned drawing of bowl and slotting jig for rim. Note relative position of circular saw before starting slots.



Below: Trimming out the inside of the bowl before sanding.

CONSTRUCTED of black walnut and maple this distinctive bowl is enhanced by the beautiful color contrast of the two woods. It may be made from 9″ wide stock or built up from pieces.

For the bowl part, one 9″ disc is required, two rings with 9″ outside diameter, one ring with 8⅜″ outside diameter, onto which 2 slotted maple rings 9″ in diameter and ⅜″ thick are glued. All black walnut stock is ¾″ thick. First mount the 9″ disc on the faceplate of the lathe and turn out a center recess 3″ in diameter, and $\frac{1}{16}$″ deep.

To cut the decorative grooves mount each maple ring on a ⅜″ piece of waste stock, place in the jig (see drawing) mounted on the miter gauge, which is set at a 45 degree

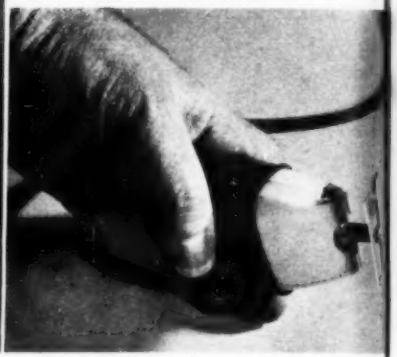
[*Continued on page* 156]

POCKET POWER

by Ken Murray

Small work of all kinds is speeded up and made easier with this versatile little tool, converted from an electric razor.

Left: The polishing accessory will buff metal or plastics. It may also be used with the sanding sleeve (foreground). Below: Razor blade attachment makes tool into power knife for cutting soft materials. Not intended for shaving.



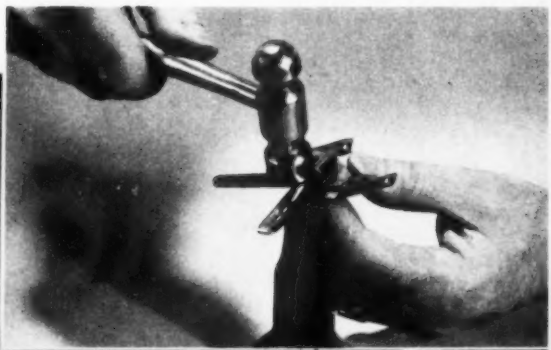
Above: Removing excess material from the plastic case, around drive shaft. Right: Thin layer of rubber tape around armature reduces stroke and quiets tool.

ALTHOUGH it is not intended to supplant one of the larger hand power tools, for light work this pocket-size tool packs plenty of wallop that makes it useful on all kinds of small projects. It is outstanding, when you consider the many things it will do and then take a glance at the price tag. The power unit is housed in ivory plastic with a live-rubber hand grip and together with cord and plug it fits into a neat simulated-leather carrying case with snap fastener. Together with a dozen accessories the entire cost is around $1.00!

Fitted with one of the interchangeable accessories the unit is a power scroll saw which will zip through veneer and similar thin materials.

TOOL For Home Craftsmen

The scissors will cut rapidly through paper or thin cloth, as seen below. Right: Riveting a small pair of scissors, with handles cut off, to an attachment bracket.



Right: A 10c tap is used to thread the accessory attachments when a set screw is required.

Another accessory converts it into power scissors or shears which need merely to be guided through paper and thin cloth to cut any design. It can be used for sanding small articles, for polishing and buffing, filing metal or plastics, for engraving your name or initials on tools or jewelry. As a power eraser it does fast and clean work and it will also give a fine point to pencil lead, makes possible speedy retouching of photographic negatives and prints, dry-point etching of celluloid, engraving, cutting and grinding of glass, and will speed up many other jobs of this nature.

The basic part of the unit is an inexpensive

With the saw accessory the tool will zip through veneer and thin plywood, leaving smooth edges (left). A strip of brass fitted to the tool and used with either valve grinding compound or carborundum powder will cut and carve glass (center). Use of the sanding disc is shown at right. It is ideal for miniature work.

Part of a 10c automatic pencil makes up this accessory, which speeds up retouching of negatives and prints.

The graver attachment will write your name on tools; also use it for engraving jewelry and for cutting or ornamenting other small-sized work.

The pencil accessory will hold a needle for rapid work in drypoint etching. It may also be used for making perforated stencils.

Glass may be engraved with a small mounted silicon carbide wheel as supplied for larger power tools.

electric razor of the AC or vibrating type, with the shaving head removed and discarded. These can be obtained at various prices at most any drug or department store, but you can secure them at from 42c up when ordering by mail. The one illustrated was found very suitable for the purpose as it is powerful and permits of adding accessories without difficulty. It is sold by Spors Company, Le Center, Minnesota, by whom it is catalogued as "The Underwood Dry Shaver," No. 2H20; sample price 95c, or 89c each in dozen lots. In ordering, postage on 14 oz. should be included. These prices include cord, plug, leatherette case and all.

After unpacking the shaver, unscrew and remove the shaving head as it will not be

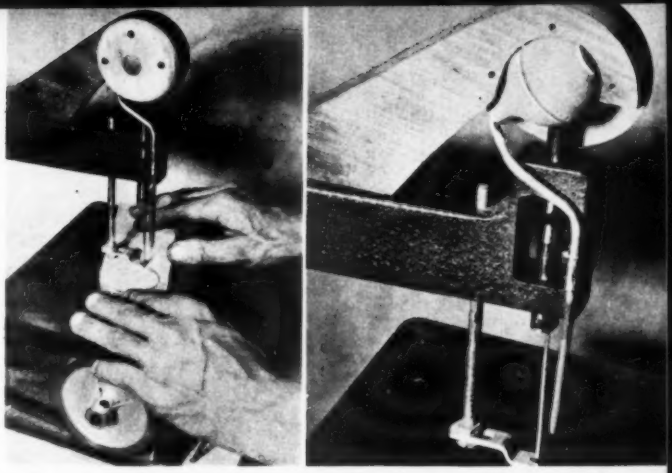
[*Continued on page* 157]

Above: Artists and draftsmen will find this pencil pointer quick and efficient. Below: The filing attachment; at 7,200 strokes per minute it does brilliant work on small objects.

All you have to do is touch the eraser to the paper; it does fast, clean work.

Homemade Jigsaw Blower

THIS simple and efficient jigsaw blower has no moving parts to wear out. Some wood, a 1 ounce syringe bulb, a length of copper tubing and a few screws are all that is required. The holder for the bulb is cut to the shape shown from ¾" material and the two side pieces turned from ½" stock. The tip of the syringe is cut off and a length of copper tubing bent to shape shown is inserted. The holder is attached to the arm of the jig by means of a large screw inserted underneath the arm. As the jigsaw operates it presses bulb, forcing air through tube.

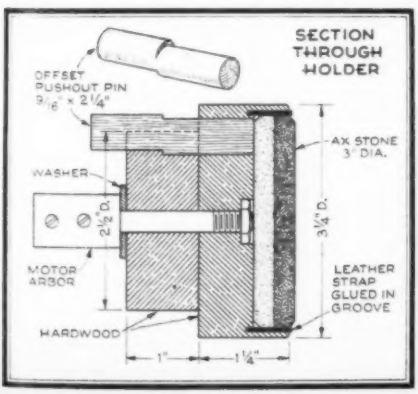


The blower automatically keeps your work free of sawdust. Below: only three simple parts are needed.

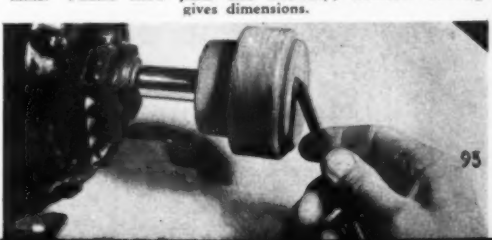
SHOP Suggestions

For Speedy Honing

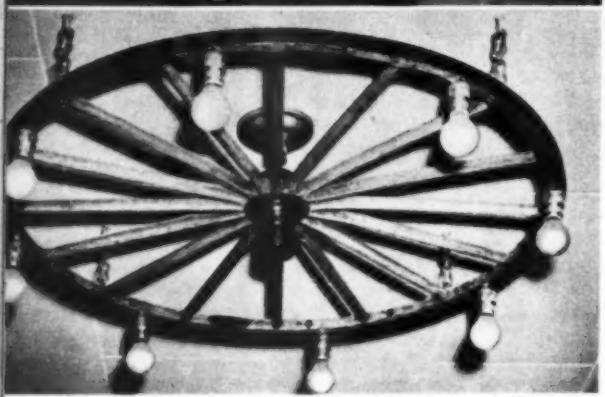
MOST busy workmen dislike taking the time to properly hone their tools. The handy gadget shown in the accompanying photos speeds up this job considerably. A 3" round ax stone having a fine and a coarse side is used. This stone is mounted in a holder made as shown, from walnut or other hardwood. Use on motor arbor or lathe.—*B. Nielsen.*



Holder for the honing stone is turned from hardwood on the lathe. Photos show parts and assembly; sectional drawing gives dimensions.



Wagon Wheel Light Fixture



An old carriage or wagon wheel and a few simple parts are all that are needed to make this attractive game room or den light fixture.

by Drew DeVriendt

A TOUR some Sunday afternoon in search of a carriage or buggy wheel is both enjoyable and often amusing. When one is found do not let the appearance of an old weather-beaten and bleached out wheel discourage you. The main thing is to find one with the spokes intact, the rim on in fairly sound condition.

After you have the wheel, tighten up the rivets which connect the rim to the round of the wheel, tighten the spokes and saw off the hub on the inside. Knock out some of the wooden casing inside the hub. The hub is sawed off so the light fixture will fit up close to the ceiling, where it is to be mounted. Drill 3/8" holes 15" apart in the rim and then the job is ready for refinishing. Take medium sandpaper and begin the process of refinishing the wood. If faster sanding is necessary, wet the

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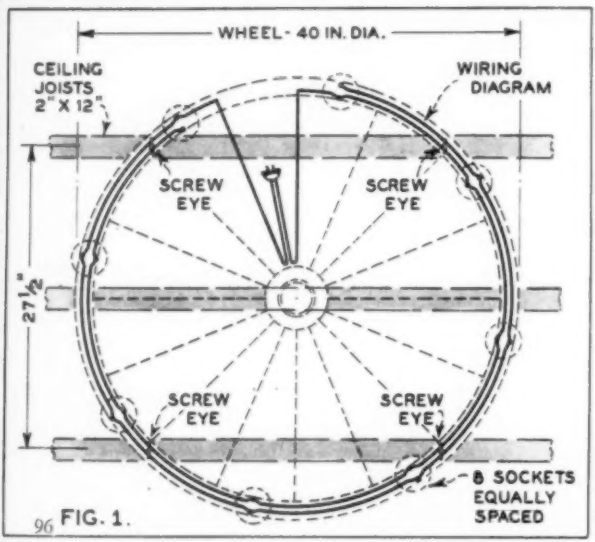


FIG. 1.

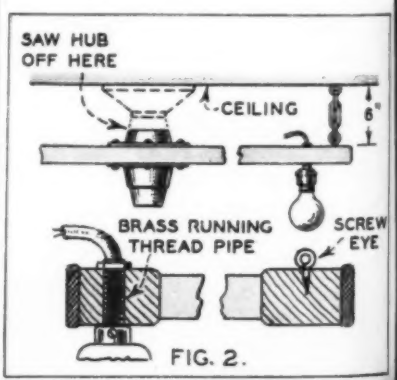


FIG. 2.

Three rustic lamps. The one on the left is made from a dead cedar limb; center one is from a green cedar limb; right one is from a red fir knot.

Rustic Cedar Lamps

Above: Two steps in preparing the lamp. At left is limb prepared for necessary trimming. Drill on solid line and cut on dotted ones. Right: Limb cleaned and sawed to rest perfectly level. Below: Completed lamp ready for shade is seen at left. Right: The lamp in a suitable setting, in this case a mountain lodge.

TWISTED cedar limbs, knotty red fir or any odd shaped or unusual piece of wood can be made into attractive table lamps at a very little cost and with the use of only a few tools. Anyone with a sharp eye and a little imagination can usually find many peculiarly shaped limbs in passing through any wooded district that will make effective and appealing lamps.

The only tools necessary are a hand saw, one steel wire brush, a pocket knife or other sharp edged tool and a long shank 3/8" wood auger. Electrical fixtures for the lamp may be selected to suit the individual taste; in the lamp illustrated a double socket

[*Continued on page* 160]

Modeling With Copper Foil

Above are two examples of the beautiful results obtainable with copper foil modeling. Note delicate highlights and shadows.

MODELING with copper foil is interesting, simple, and inexpensive. Startling results are the rule rather than the exception. It is further recommended because expert skill or difficult techniques are not required. It is an excellent activity in the development of creative abilities.

Purchase very thin sheet copper foil of 34 gauge. The foil is sold in rolls 12 inches wide. One square foot of foil will be sufficient for the first attempt, and it will cost about 15c. You will also require a fine grade of steel wool which is used for the final cleaning of the picture and in polishing it. Another item is a product called Liver of Sulphur. This is purchased in a drug store, a dime's worth being sufficient for many pictures.

For the first outline one uses a hard pencil. For further outlining use is made of odds and ends which are readily available, such as old nut picks, coarse steel knitting needles, or orange sticks. For modeling and development of the design it is necessary to use any of the following or similar materials: Wooden penholders having blunt ends, old table knives with rounded handles, spoons of a variety of shapes and sizes, wooden dowels, etc., etc.

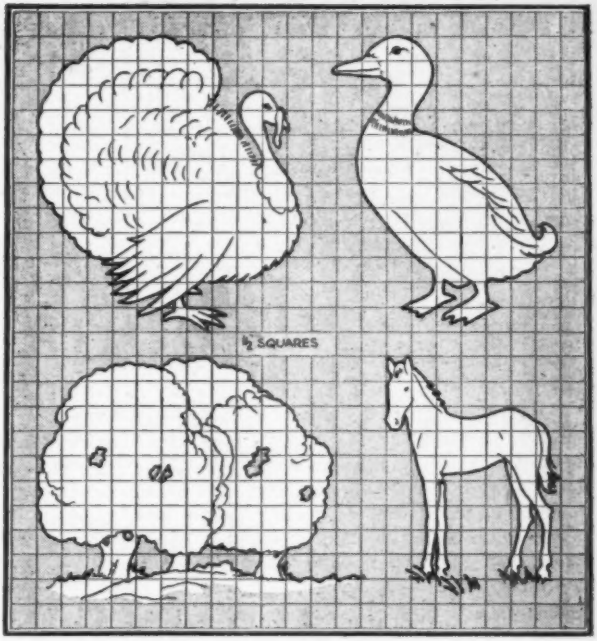
Design is first transferred to copper with lead pencil, then worked into relief as described in text.

Method of Modeling

Obtain a suitable design. Excellent designs for the beginner will be found in the tracing books sold at the dime stores. Pictorial designs are as

by M. Grossman

Beautiful reliefs in polished copper may be obtained with the method described here. They may be used on cigarette boxes, book ends or for other decorative purposes around the house.



Right: A few suggested designs for practice work. Draw the squares full size on paper after which the drawings may be readily copied.

a rule the best. Select a good composition with a graceful flow of lines for beauty rather than one which depends on masses, shading effects, etc. Intricate detailed designs should be avoided at the beginning. The designs in which line drawing and good composition are predominant are most desirable.

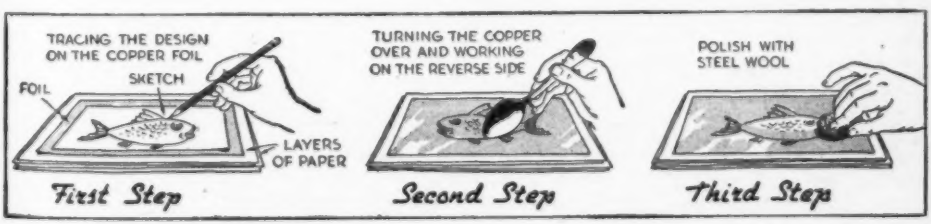
The first step is to transfer the design to the copper. This is done by placing the design on the copper and tracing the design with a well sharpened, moderately hard lead pencil. Before beginning the tracing operation it is advisable to place several sheets of newspaper (paper toweling is ideal) under the copper foil, this will permit more depth to be obtained in the tracing lines.

After the design has been traced upon the copper foil, turn the foil over on its other side. See to it that you have the newspapers or toweling under the foil as you did before. Now you work on the reverse side. Your tools are any of the blunt end instruments heretofore mentioned. Select a spoon if you desire and begin to press out the background of the picture you traced on the copper. Work on it slowly, but don't overmodel the design. In your later pictures you will naturally practice more intricate modeling. But now, you want the design to stand out in delicate relief.

When you have finished modeling, it is necessary to polish the picture with fine steel wool. This will remove all fingerprints and oiliness. If an antique finish is desired, after polishing apply to the surface of the foil a solution of Liver of Sulphur. The solution is made by dissolving a few small pieces of the Liver of Sulphur in water. The solution can be applied with a soft paint brush, cloth, or wad of cotton waste. As a result of this application, the copper will turn a rich dark brown color. Now polish again lightly with the steel wool, bringing out the high lights desired.

In the finishing operation you will have every opportunity of expressing your origi-

[*Continued on page* 146]



Three steps in the modeling process. Layers of paper under the foil help create a well modeled relief.

Above is the hunters' and trappers' fire, on which a whole meal can be cooked in a jiffy. This is useful where stones are not available.

Make Your C

Some practical hints on building campfires that will do all types of cooking without setting either yourself or the woods on fire.

THERE are several kinds of campfires we may use on our camping trip, so let us select the one best fitted to our need. Some have a favorite spot where they go to spend a night or week, and here they have a fireplace, made of rocks, placed in a semi-circle to support cooking utensils. If rocks are not at hand, poles may be cut and used, selecting two with crotches for the upright supports.

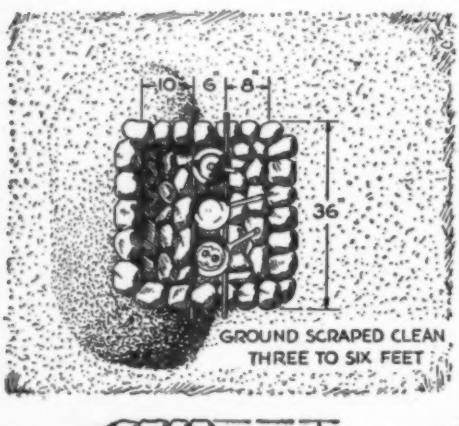
A good cooking fire is essential. One way is to dig a narrow pit about a foot deep, roll a log up beside it on either side, and level off the top of each end, leaving a space about 20 inches between the logs at the opposite end. Build the fire between the logs, which form the sides of the camp "range," on which you may cook the meal in safety. Or, you may place the baker at the open end, where the fire is hottest.

In building a fireplace, scrape the grass and sod away from a space about 6 feet square; excavate, in the center, a pit 3 feet square and 2 feet deep, lining this with heavy stones up to the ground level; at the back erect two tiers of rock as a windbreak to keep smoke from blowing into the cook's face.

A piece of ½-inch iron pipe may serve as fire-irons; a piece of sheet-iron placed on top, with one or two joints of 4-inch pipe placed at the back, increases the draft and keeps dishes from getting smoked.

Campers need to build and maintain fires that will bake, fry, roast, or stew. None of these need occupy a space more than 2 feet across, and most of them should be smaller. It is a mistake to make and keep a large fire for cooking. All that is needed is a fire hot enough to cook the food without "cooking the cook." Fires which bake, roast, or stew, may be larger than those used for frying. A fire may first be used for roasting or stewing and then for frying.

Use a small fire to fry pancakes, bacon and eggs, and kabob. The hunters' and trappers' fire is one of the best. it is an open-trench fire. This is a good type where fuel is scarce or where there is danger of the fire spreading into the underbrush.



Left: An ideal type of stone fireplace. The raised back prevents the wind from blowing smoke and fire out of the hole by causing a certain amount of draft.

Campfire Safe

by Earle W. Gage

To make the hunters' and trappers' fire, place two small logs on the ground so that they form a very deep V, with the open ends about a foot apart. Logs 6 inches through and 2 or 3 feet long will do. Place them so the wind will blow diagonally into the space between, from the open end. Build the fire between the logs, and allow it to spread the length of the logs. The hottest part is toward the end where the logs come together, which makes it easier for you to cook there, holding small pans, etc., over the blaze, using the log as protector.

If you are frying, you may rest the pan on the two logs and keep the handle over the side where it will be cool. Two persons may work at the same time, from opposite sides. If you wish to support a pail, pan, or some utensil over the fire between the logs and find the space between the logs too great to suit the need, you may cut green sticks and lay them across and on these rest the cooking utensil. Nearly all that you may wish to cook for the meal may be cooked over this fire.

The open-trench fire is popular. To make this, dig a trench 8 or 10 inches wide, the same depth, and 2 or 3 feet long. Line the trench with stones, the size of your fist or smaller, and along two long sides place logs similar to those used in the hunters' and trappers' fire. Now build the fire in the trench, and cook as you would in the other fire. With green sticks across the side logs, we have a place to prepare a meal for five or six persons. A brisk fire in the pit is excellent for boiling foods; afterward, you may place dishes on the coals and stew.

It is easy to make a special bake oven. Dig a trench or pit a foot and a half wide and nearly as deep. Line with stones the size of your fist; over the top place two or three medium-sized logs. Build a fire under the logs and on the stones, and allow the logs to catch fire and the stones to become red hot. Then extinguish the fire; rake out the embers, or leave them in if you wish; place the food to be cooked on the stones or embers; close the oven by laying sods on top of the hot logs to cover the whole top. The glowing logs and the hot stones provide a sustained and

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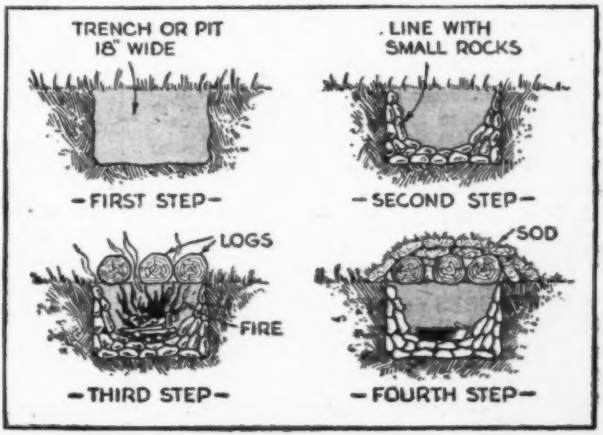
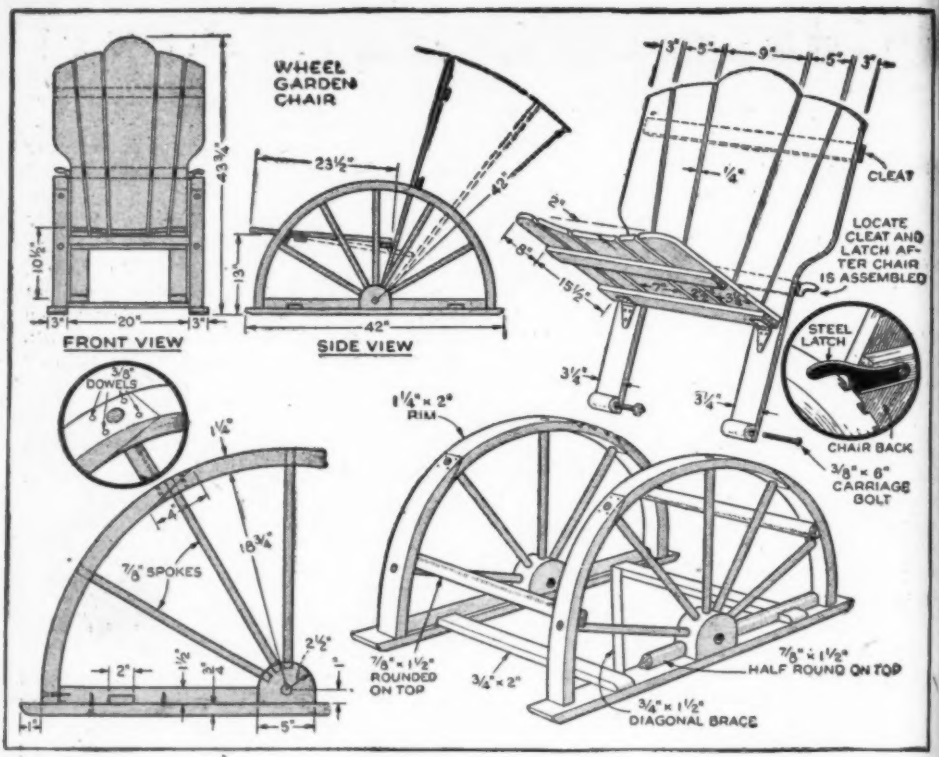


Four steps in making an efficient baking oven, as described in the text.



WHEEL GARDEN CHAIR

THIS novel garden chair, supported by what appear to be split wagon wheels, will withstand sun and rain without coming apart because it is assembled with galvanized screws, dowels and casein glue. If left unpainted it will assume a mellow weathered tone in keeping with the garden environment. The seat-back is adjustable from the upright to easy reclining positions, and can be used with or without cushions. Note that the wheel rims are not bent, but cut in three lapping sections. These are scroll-sawed or band-sawed from 2"x5" pine, casein glued and secured with dowels and the spoke ends, as shown.—*Hi Sibley.*

PUMP FOR CAMP

ARCHIMEDES devised a method of raising water which became known as "Archimedes' Screw." This can be put to good use in a camp where no pump exists. It is especially valuable in raising water from a hidden spring or water supply difficult to approach. All you need is a long, slender cylinder, a piece of hose, a wheel or crank and a sort of

[*Continued on page* 156]

Outdoor Basketball Court

by Alvin M. Youngquist

POPULARITY of basketball is now tremendous, particularly in the Middle West. Professional teams, factory leagues, college, high school, and grade school teams are engaged everywhere in exciting competition. And we must not overlook the vast numbers of boys who are tossing the ball into improvised baskets on posts, over the garage door; in fact, any place where a basket can be set up. With these enthusiasts, the sport is not confined to the basketball season—they are at it more or less all year. Played out-of-doors, it is an especially engaging and healthful recreation. If there isn't room for a standard court, a smaller court does very well; and where the space is very restricted, one basket may serve not only for practice shots, but improvised competition can be engaged in. The "floor" may be rolled clay - like that of a tennis court—or turf, or in some cases concrete. Mounting a basket on a wall, or flat against a post, is not very satisfactory as there should be space for play under the basket and clear space beyond when charging in.

The regulation size backboard, correctly mounted on a post as illustrated, is not expensive or difficult to construct. Waterproof, fir plywood 4 ft. x 6 ft. makes an excellent board. Be sure to get the real *waterproof* plywood. The board should be fastened with 1½"-10 screws into a 1¾"x1¾" (standard

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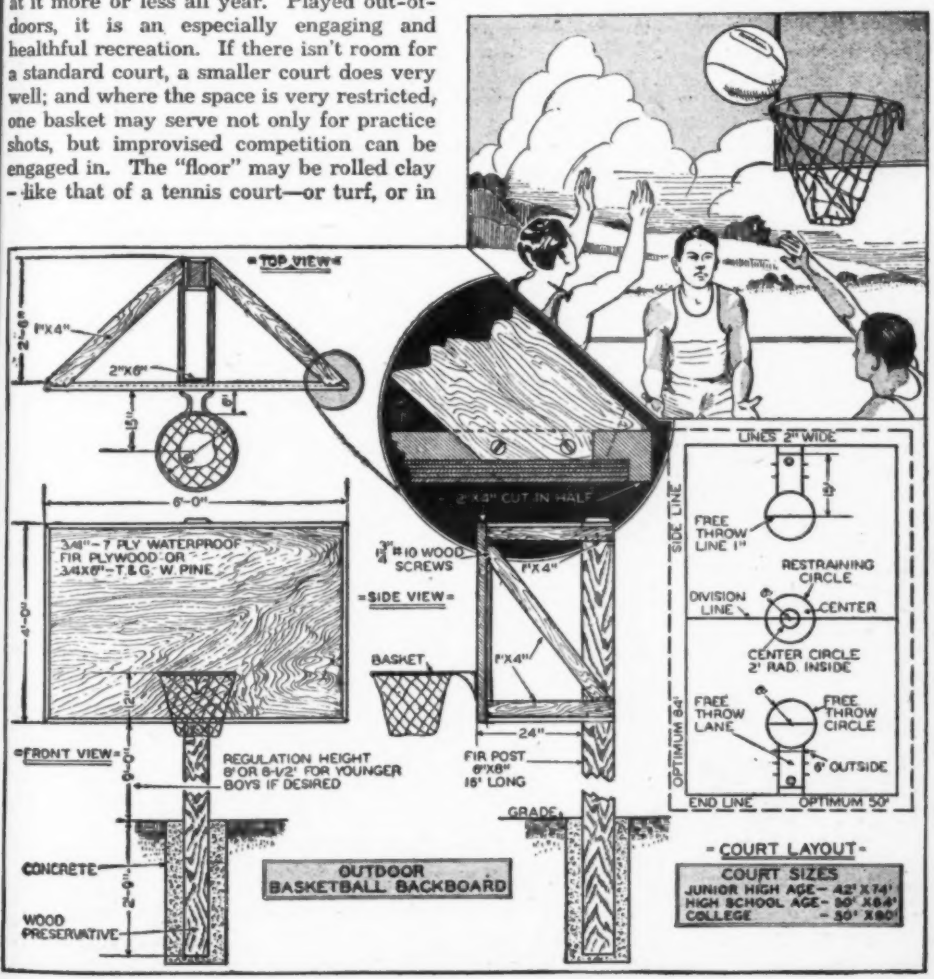
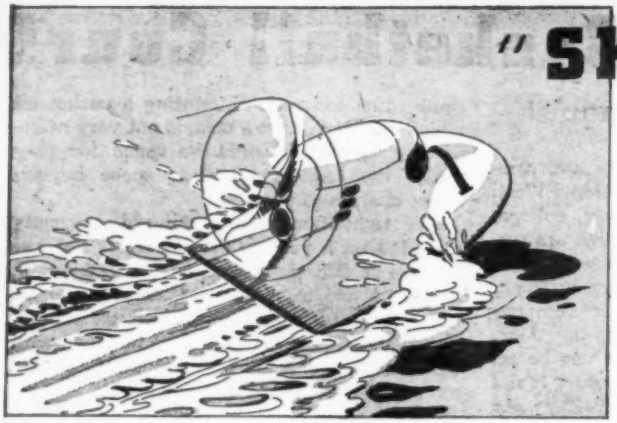




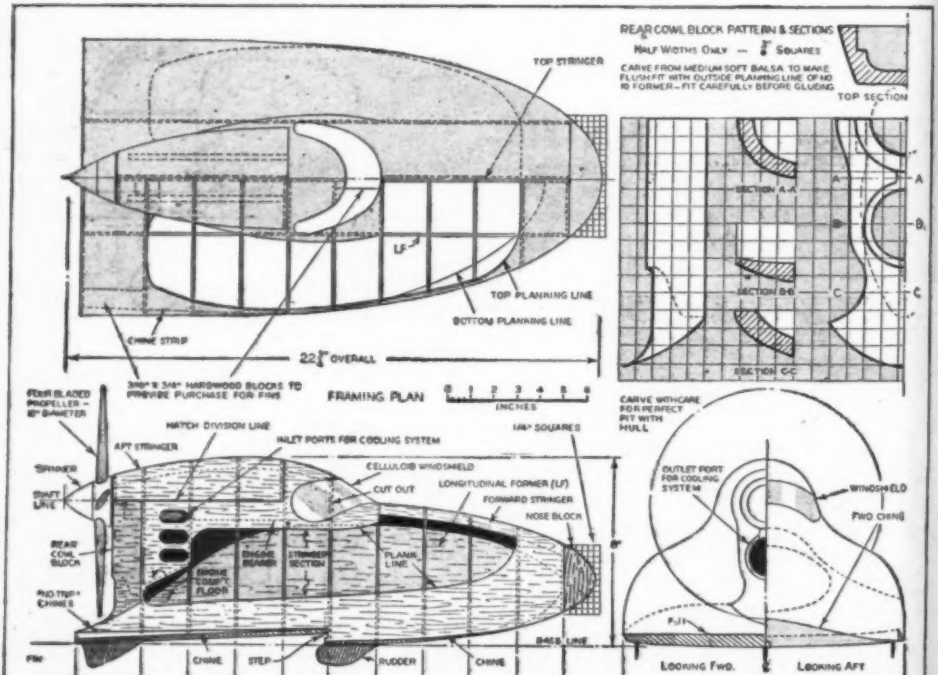
"SKIPPER,"

High power and low weight coupled with teardrop design make this 23-inch air driven model boat a flashing bundle of aquatic dynamite!

by
Fred C. Tuxworth

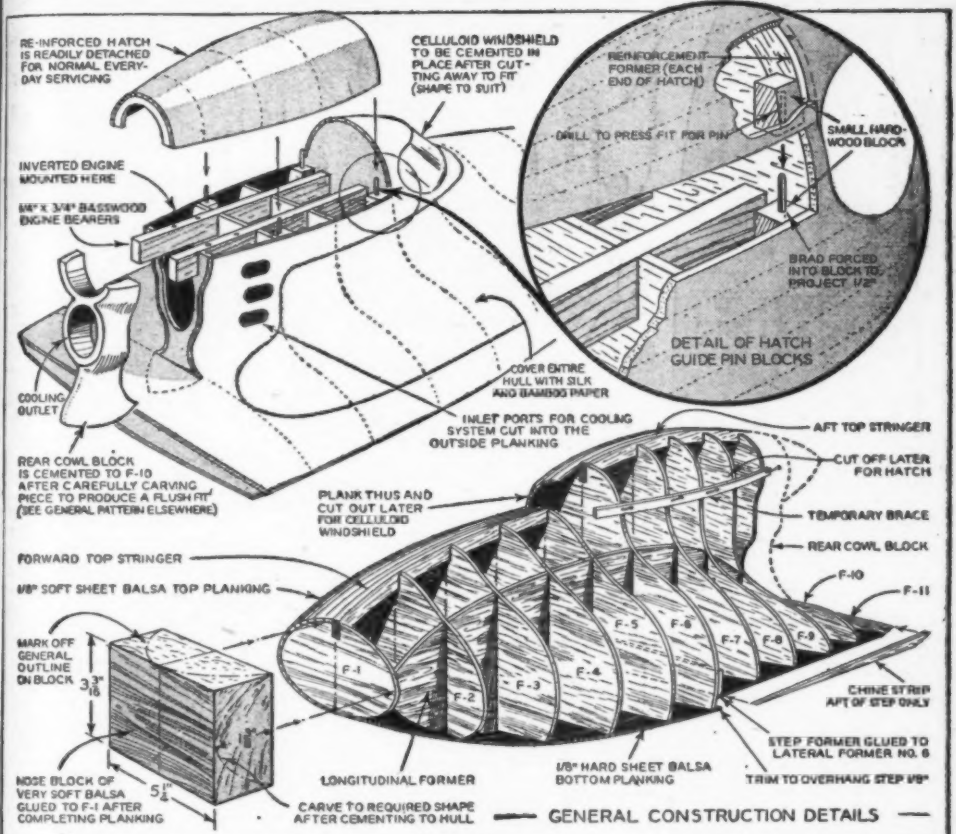
CONSTRUCTION of this streamlined, speedy model boat is simple, practical, and very inexpensive. Only a few hand tools are required, and most of the materials can be picked up at a model supply store at a very reasonable price. The drawings and instructions presented here describe a model that was built and operated very satisfactorily; however, changes in design to suit the individual builder's taste or curiosity are very much in order. A one-fifth horse power engine was used to power the original model, but the drawings can be scaled up or down to suit any size engine available.

The model is constructed of soft balsa wood except where otherwise specified. It is made



Looked at from any angle, the shape of this hull shows minimum air and water resistance. Note simplicity of bulkhead or frame arrangement in drawing above.

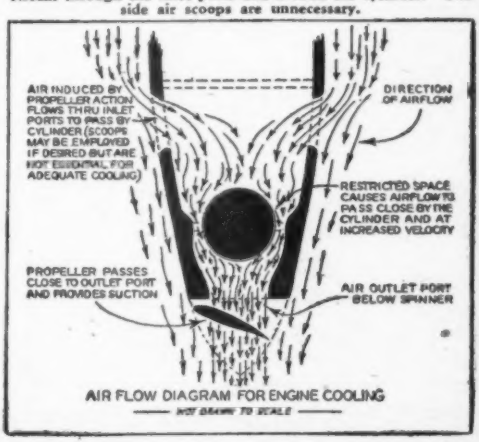
Fast Model Aeroboat


RE-INFORCED HATCH IS READILY DETACHED FOR NORMAL EVERY-DAY SERVICING
CELLULOID WINDSHIELD TO BE CEMENTED IN PLACE AFTER CUTTING AWAY TO FIT (SHAPE TO SUIT)
REINFORCEMENT FORMER (EACH END OF HATCH)
DRILL TO PRESS FIT FOR PIN
SMALL HARDWOOD BLOCK
BRAD FORCED INTO BLOCK TO PROJECT 1/2"
DETAIL OF HATCH GUIDE PIN BLOCKS
INVERTED ENGINE MOUNTED HERE
1/8" X 3/4" BASSWOOD ENGINE BEARERS
COOLING OUTLET
COVER ENTIRE HULL WITH SILK AND BAMBOO PAPER
INLET PORTS FOR COOLING SYSTEM CUT INTO THE OUTSIDE PLANKING
AFT TOP STRINGER
CUT OFF LATER FOR HATCH
REAR COWL BLOCK IS CEMENTED TO F-10 AFTER CAREFULLY CARVING PIECE TO PRODUCE A FLUSH FIT (SEE GENERAL PATTERN ELSEWHERE)
PLANK THUS AND CUT OUT LATER FOR CELLULOID WINDSHIELD
TEMPORARY BRACE
REAR COWL BLOCK
FORWARD TOP STRINGER
1/8" SOFT SHEET BALSA TOP PLANKING
F-10
F-11
MARK OFF GENERAL OUTLINE ON BLOCK
3 3/16"
F-1
F-2
F-3
F-4
F-5
F-6
F-7
F-8
F-9
CHINE STRIP AFT OF STEP ONLY
STEP FORMER GLUED TO LATERAL FORMER NO. 6
NOSE BLOCK OF VERY SOFT BALSA GLUED TO F-1 AFTER COMPLETING PLANKING
5 1/4"
LONGITUDINAL FORMER
1/8" HARD SHEET BALSA BOTTOM PLANKING
TRIM TO OVERHANG STEP 1/8"
CARVE TO REQUIRED SHAPE AFTER CEMENTING TO HULL

GENERAL CONSTRUCTION DETAILS

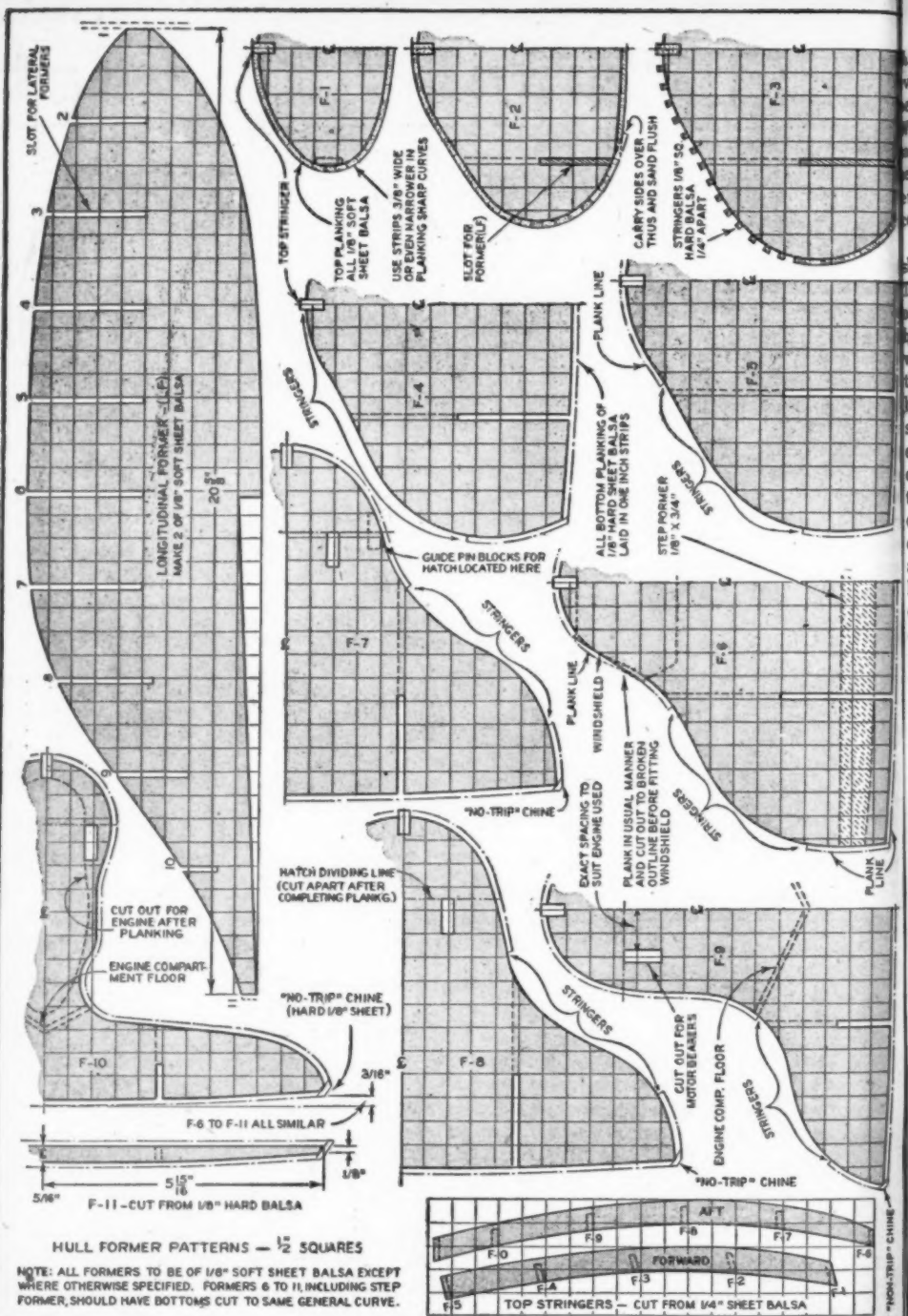
up of two longitudinal and eleven lateral formers which are slotted and assembled like an egg crate. This construction forms many water-tight cells which make the boat non-sinkable. The formers are made from ⅛-in. soft sheet balsa. For economy they are best cut from one large sheet which is made by cementing several 2-in. or 3-in. width strips together. Lay out a full-size heavy paper pattern for each former which can be drawn around on the wood. Notice carefully the indicated grain direction. A knife or jig saw can be used for cutting. They should be cut accurately but need not be particularly smooth. Assemble the formers and align them very carefully. Make sure that the frame is not warped and that all of the lateral formers of bulk heads are flush with the longitudinal members on

Diagram below indicates how propeller sucks air in a steady stream through the inlet ports and around the cylinder. Outside air scoops are unnecessary.


AIR INDUCED BY PROPELLER ACTION FLOWS THRU INLET PORTS TO PASS BY CYLINDER (SCOOPS MAY BE EMPLOYED IF DESIRED BUT ARE NOT ESSENTIAL FOR ADEQUATE COOLING)
DIRECTION OF AIRFLOW
RESTRICTED SPACE CAUSES AIRFLOW TO PASS CLOSE BY THE CYLINDER AND AT INCREASED VELOCITY
PROPELLER PASSES CLOSE TO OUTLET PORT AND PROVIDES SUCTION
AIR OUTLET PORT BELOW SPINNER

AIR FLOW DIAGRAM FOR ENGINE COOLING

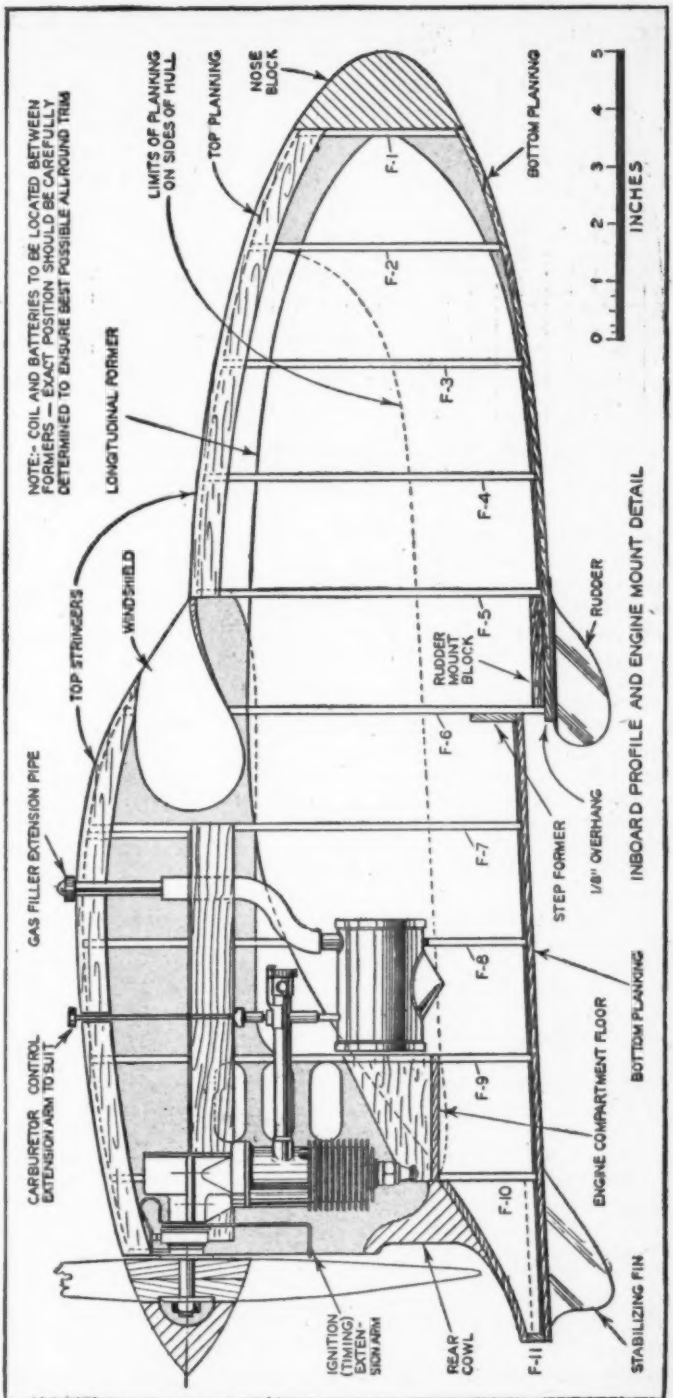
NOT DRAWN TO SCALE



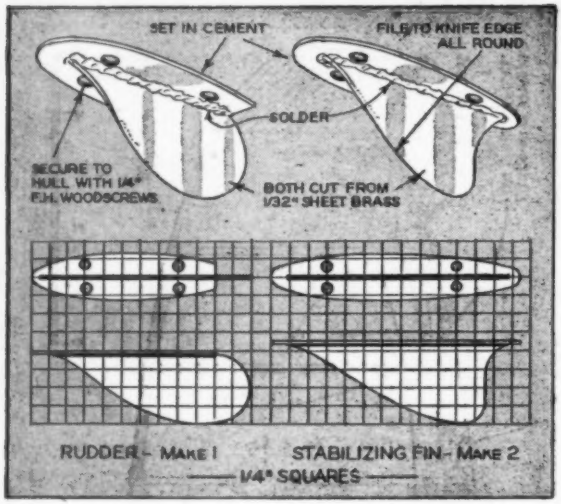
Draw the formers full size and full width on thin paper and transfer to sheet balsa, or paste the paper to the wood. Cut out slightly beyond the line to allow for trim. Patterns as given allow for all bevels.

e bottom. Any un-veness on the top may e trimmed off later. hen the formers are atisfactorily assembled ecure them with gen-rous quantities of ement.

The bottom planking should be put on first. These planks should be of hard ⅛-in. sheet balsa and about 1-in. wide. Begin by putting the center ones on first both fore and aft of the step. Next put one on each side of these first ones and so on until the bottom is entirely covered. Use plenty of cement to secure them and plenty of pins to hold them until the cement dries. In front of the step some of the planks may have to be trimmed slightly to conform to the slight lateral curvature of the bottom. When the cement has dried, the ends of the planks may be cut off. Bevel the outside planks aft of the step and add the "No-Trip chines." Before any more planking is done the rest of the frame should be completed. Place in the top stringers, the engine bearers (the spacing of these is naturally dependent upon the engine to be used) and the floor of the engine compartment. The engine compartment floor is made from two pieces of hard ⅛-in. sheet balsa and are inclined as shown. The positions of



Study this cross-section diagram carefully before starting construction, as it gives a comprehensive idea of the model's layout. Most model gas engines will run inverted if the gas tank is relocated as suggested.


SET IN CEMENT
FILE TO KNIFE EDGE ALL ROUND
SOLDER
SECURE TO HULL WITH 1/4" F.H. WOODSCREWS
BOTH CUT FROM 1/32" SHEET BRASS
RUDDER - MAKE 1
STABILIZING FIN - MAKE 2
1/4" SQUARES

Left: Rudder and stabilizer fins. Former is operated by slightly warping projecting ports in desired direction.

these are also dependent upon the size of the engine being used. Three pieces of ¼x¾-in. white pine should be glued to the top surfaces of the bottom planking immediately above the positions of the stabilizing fins and rudder to receive the screws used in mounting these parts.

The planking may now be completed. Use narrow strips of soft balsa, approximately ⅜-in. wide; and use even narrower strips where the curves are sharp. Next add the stringers. They should be about ¼-in. apart, but their exact positions are left to the builders.

After the planking and stringers are all in place the frame of the hull may be completed. The nose block is of very soft balsa and is cut to shape after it is cemented in place on former number one. The rear cowl block, however, is cut to shape and hollowed before it is attached. The motor hatch may be cut from the hull by slitting the planking with a razor blade and cutting the formers with a coping saw or hack saw blade. Reinforce the motor hatch with a former at the forward end and anywhere else it appears necessary. Insert the small basswood or white pine blocks for the guide pins. The pins should extend about ½-in. from the lower blocks and the friction on them should be enough to keep the cowl in place. Cut the cooling holes in the side of the engine compartment. Scoops over these holes may be added if desired but they are entirely unnecessary. No trouble whatsoever was experienced in keeping the engine cool. The windshield hole may be cut out and celluloid cemented in. Fill any large holes or cracks with plastic wood (the covering will take care of the small holes) and sand the entire hull smooth in preparation for covering.

Several types of covering may be used. Silk or bamboo paper being sufficient. The strongest covering can be obtained by covering the frame entirely first with silk and then with narrow strips of bamboo paper over the silk. Use plenty of airplane dope when attaching the strips of bamboo paper; and when the covering is dry it can be sanded smooth with a light grade of sand paper. Give the entire hull about four coats of clear airplane dope and then paint with lacquer. Give the engine compartment several coats of varnish to make the wood impervious to gasoline and oil.

In installing the engine a few things should be kept in mind. The engine compartment, in order to keep it as waterproof as possible, is designed so that the spark plug cannot be removed without first removing the engine. To facilitate easy removal of the engine, wood screws were used for mounting, and the wires attached to the engine were made long enough so they would not have to be detached. These precautions are advisable, although it has never been necessary to remove the plug from the original engine model while it was being used. Good engine performance can usually be attained by having a fool proof ignition system. In a model boat this includes water proofing your wires. This can be done by covering them all with radio spaghetti. Use good booster batteries for starting and always choke the engine with the switch on and no trouble will be had in running your engine inverted; because a good positive spark will ignite the gas as it enters the cylinder and thus prevent flooding. The positions of the coil, condenser and batteries are not shown. These are decided upon by experimentation. Just drop the parts between the bulkheads and wedge them lightly in place with strips of balsa. The original model performed best with the coil and condenser between formers 8 and 9 and the batteries between formers 7 and 8. The model builder will have a chance to display his ingenuity in installing remote

[*Continued on page* 152]

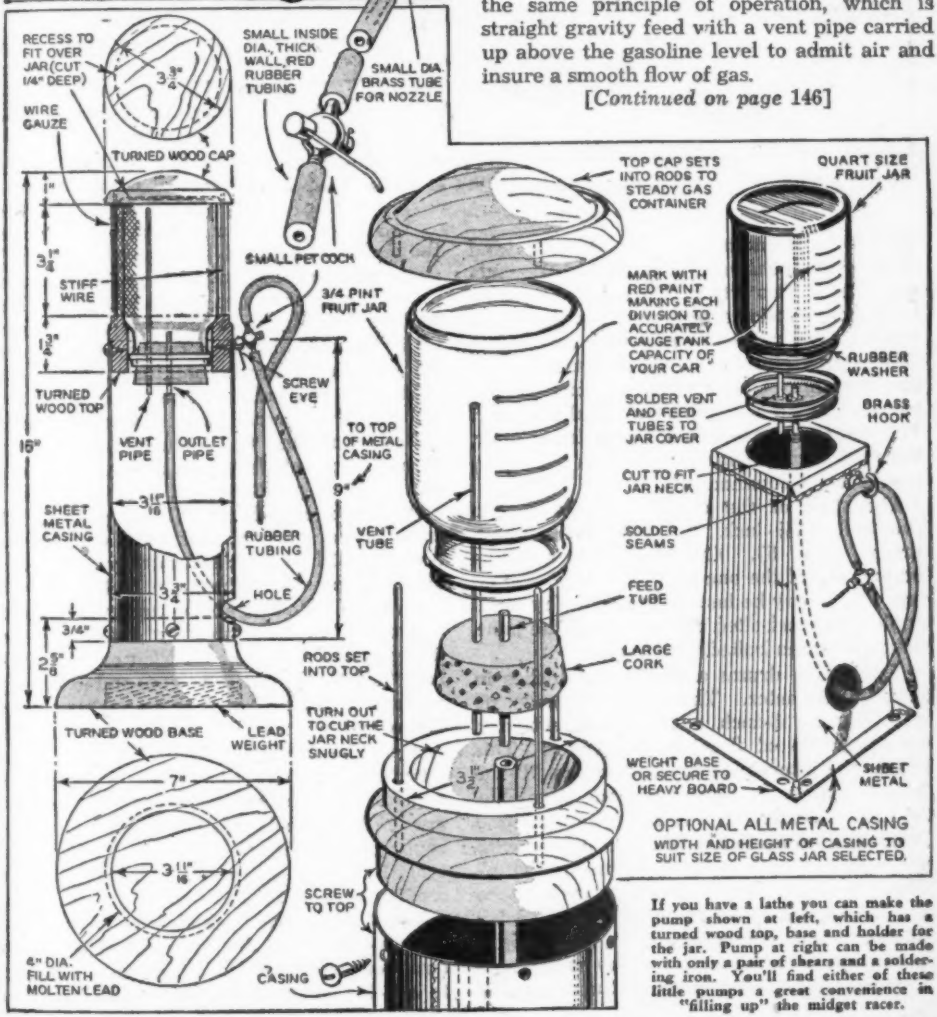
Gas Pump For Spindizzies

by Doug Rolfe

HANDY little filling stations for miniature cars are simple to make and cost a mere trifle. An old fruit jar; one foot of ⅛", outside diameter, brass tubing; a couple of feet of rubber tubing; one small petcock such as can be taken off an old toy steam engine or purchased at most model stores and some sheet metal are about all the materials required.

Two types of pump are shown, both utilizing the same principle of operation, which is straight gravity feed with a vent pipe carried up above the gasoline level to admit air and insure a smooth flow of gas.

[*Continued on page* 146]



If you have a lathe you can make the pump shown at left, which has a turned wood top, base and holder for the jar. Pump at right can be made with only a pair of shears and a soldering iron. You'll find either of these little pumps a great convenience in "filling up" the midget racer.

Small Cupola For The

by
Robert Frazier

One man can easily handle this cupola. It will melt 35 lbs. of iron at a time, or about 300 lbs. per hour.

IRON can be melted in small quantities, and very inexpensively with the small cupola described in this article. The simple materials for its construction are obtainable almost anywhere. One man can easily take care of the furnace, charging the coke and metal, tapping and pouring. Under ordinary conditions it will melt about 330 pounds of metal per hour. This can be increased to 400 pounds per hour, but such rapid melting is hard on the lining and is not recommended.

The shell of the cupola consists of two standard 15½-inch by 21½-inch grease drums (Fig. 5). Cut the head and the bottom out of the one that is to be placed on top. They may be fastened together by small angle brackets bolted to the sides of the joint, which are then bolted together.

The grease drums are about 15 inches in internal diameter. The lining is made up with regular 3-inch cupola brick set in a mortar made of fireclay and water. This makes the internal diameter 9 inches. If the 3-inch cupola fire brick are not available, 18-inch diameter drums may be used and lined with ordinary fire brick set on end with the wide face on a radial line, making the internal diameter 10 inches. The space between the bricks should be filled with the fireclay mixture. The floor of the cupola is lined with a mixture of one-fourth fireclay and three-fourths crushed fire brick. Crush the fire brick and sift it through a riddle to remove unbroken pieces. The floor lining should be about 3 inches thick at the back and sides and slope toward the tap hole where it is about 2 or 2½ inches thick.

The two tuyeres (air-blast inlet ports), 3 inches by 1¾ inches wide are located on opposite sides of the shell 9 inches above the bottom of the drum, and 6 inches above the floor lining. Cut two 3-inch diameter holes in the shell and insert 4-inch lengths of 3-inch stove pipe, leaving one inch project outside. Shape the inner end as shown in Fig. 1. Then build the lining up around the tuyeres and fill in the space between the tuyeres and the bricks with the fireclay mixture. The breast opening is 4x4 inches. The spout is formed of heavy sheet metal, flanged on one end and bolted or riveted to the shell at the breast hole. These details are all shown in the sectional drawings, Fig. 1 and 2.

A blower capable of delivering 90 to 100 cubic feet of air per minute at 4 or 5 ounces pressure will be quite satisfactory. With this air blast pressure, the coke bed is carried from 16 to 18 inches above the tuyeres. You can check on this later by examining the lining which will show a fusion or "burning-back" a little above the tuyeres and extending upward to the top limit of the melting zone. When this has been determined, a measuring rod can be made to indicate the height to maintain the coke bed when charging the cupola. If greater pressure and air volume are used, the melting zone will be too high, causing an excess of sparks to fly from the top. Lower pressure will result in a lower melting zone and cold iron.

Fig. 3 shows the layout of the blower and the air-piping to the furnace. The 3-inch outlet of the blower leads through a windgate to a 3-inch T, and the air supply branches

Workshop

Scrap iron can be quickly and safely melted in small quantities for castings, etc. with this home blast furnace.

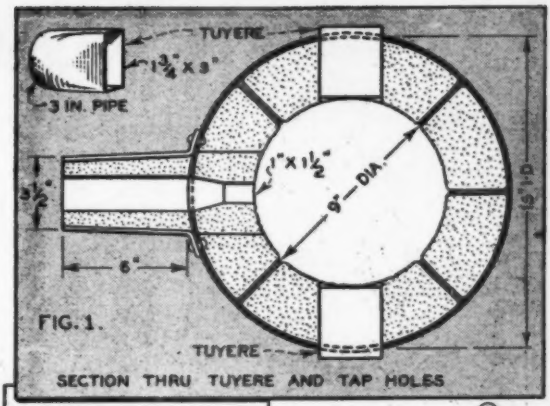


FIG. 1. SECTION THRU TUYERE AND TAP HOLES

FIG. 2.

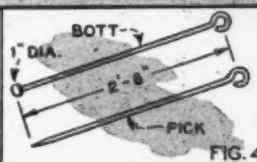


FIG. 4.

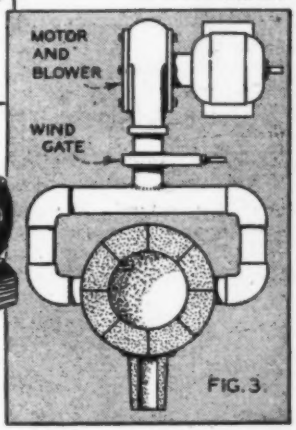


FIG. 3.

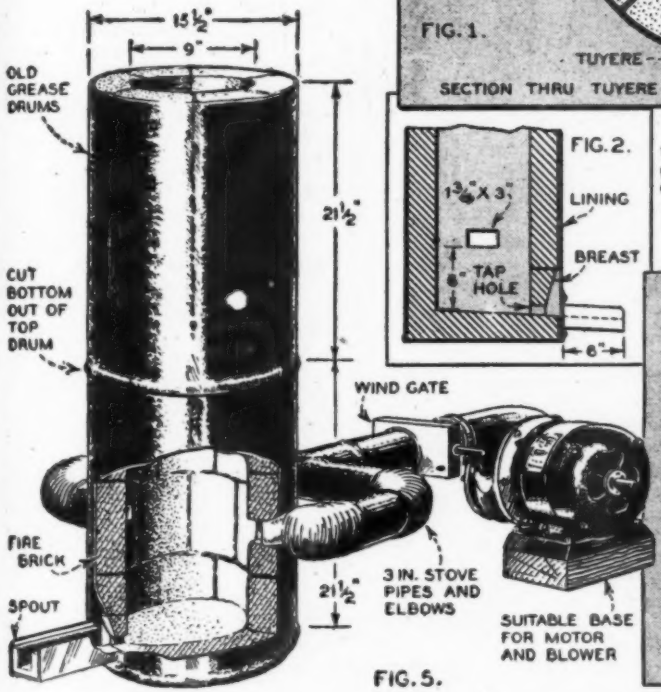


FIG. 5.

here, a line going to each tuyere. The piping is 3-inch stove pipe with the necessary ells. The windgate can be made up for you by a tinner. It is a simple sheet metal box with a movable slide to regulate the opening, and thus the air supply. Stove pipe makes an inexpensive and easily renewable air line. However, if a more permanent system is desired, 3-inch gas pipe may be used.

The cupola and blower can be set up on a frame built up of angle iron about 16 inches high. A movable wooden step can be built up to stand on while charging the furnace.

The fire is started in the cupola with shavings and small pieces of wood. Then add larger pieces of wood until the wood is piled above the tuyeres. Then add a small quantity of soft coke. This coke is easier to ignite and will start the regular coke. Regular foundry coke should be used. To yield the best melting service, the coke and iron must be broken up fine, the coke in chunks the size of an egg and the iron into small pieces with a maximum of not over 2 pounds when using good clean scrap.

Then charge in half of the amount of coke required for the coke bed. With the air admitted by the breast hole, sufficient heat should be produced by the wood fire to dry the lining and ignite the coke. If additional air is needed, you can temporarily disconnect

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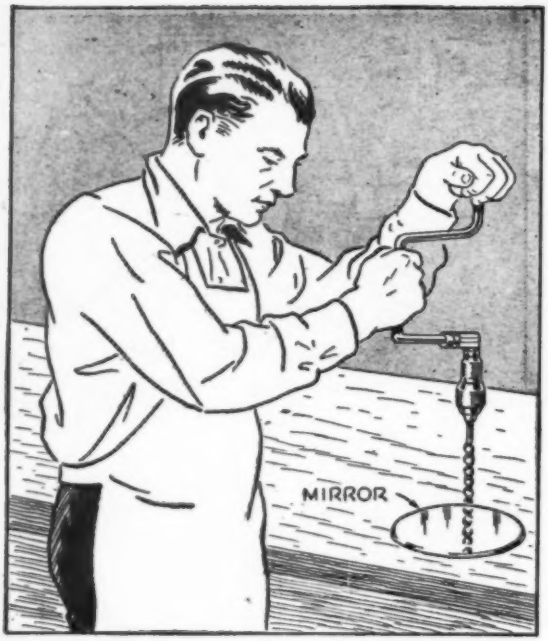
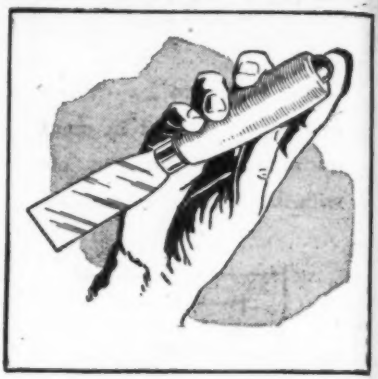


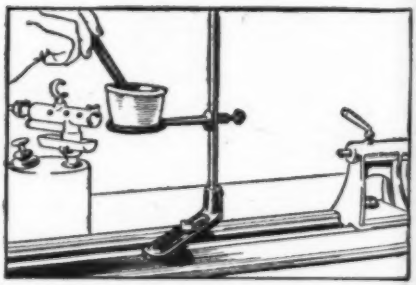
Tack Is Putty Knife Aid



IT IS often necessary, when removing or replacing a pane of glass, to give the glass a few taps to loosen it or set it, as the case may be. If a rubber tack is driven into the end of the putty knife handle, the handle can be used to tap the pane without danger of breaking it.—*W. S.*

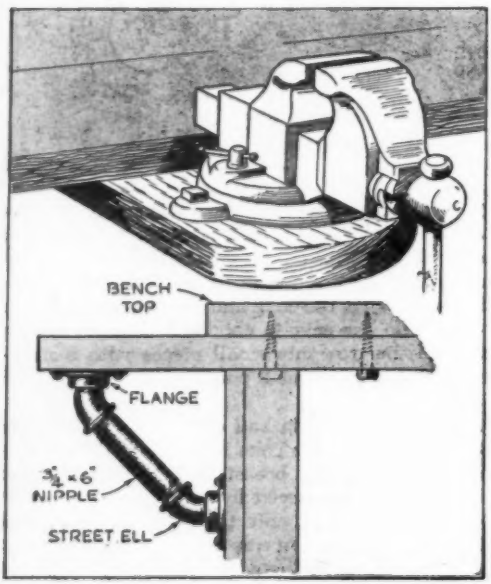
Mirror Aids In Drilling Holes

A FLAT mirror, or piece of one, will help you to drill true vertical holes with a hand drill or brace and bit. Place the mirror as close to the bit as possible.—*W. S.*



Slide Rest Holds Ring Stand

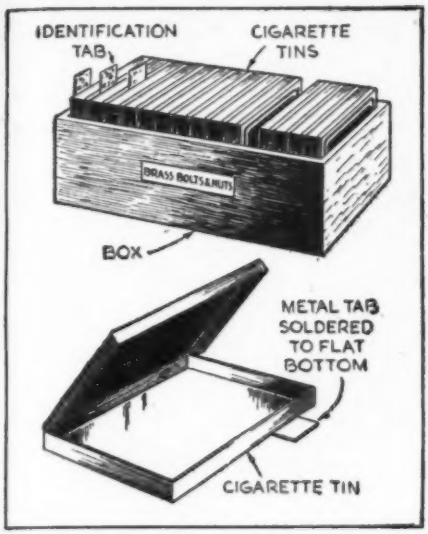
BY REMOVING the lathe tool rest from its clamp and replacing it with a wood or metal rod a foot or more in length, an excellent ring stand results that can be used for a variety of purposes. This arrangement can be used to take the place of an extra ring stand.—*W. C. W.*



Vise Extension Shelf

INSTEAD of attaching the vise directly to bench top, an extension shelf will be found very helpful. It is made of 1¾"x6" lumber long enough to extend entirely across the width of bench, projecting at front just enough to accommodate the vise, and attach by bolts or lag screws.—*C. B.*

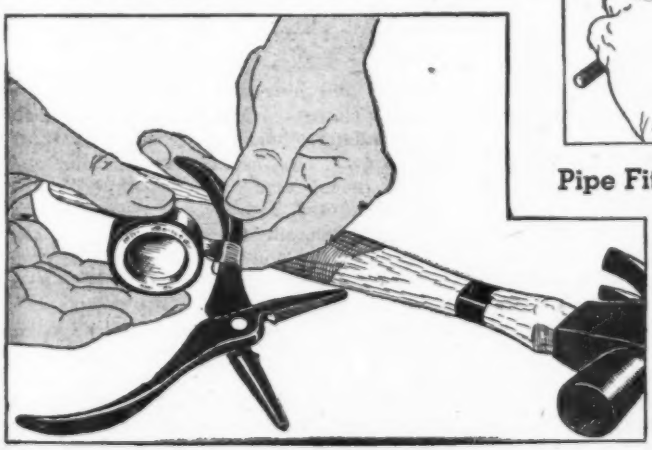
Cigarette Tin File

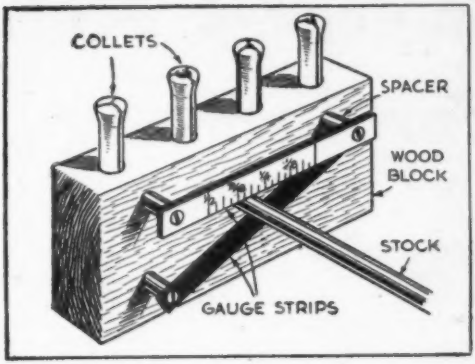


MACHINISTS using very small parts can file them conveniently in ordinary cigarette flat tins of "fifty." Under the bottom and projecting out about ¾" beyond the closing edge of the box should then be soldered a metal tab. The name of the article, dimensions, etc., can then be written on the tab.—*L. B. R.*

Cellulose Tape Identifies Tools

TOOLS can easily get mixed when a group of mechanics are working together. To avoid confusion, it is best to place some sort of identification mark on each tool. This can be accomplished by putting a strip of colored cellulose tape on each tool.

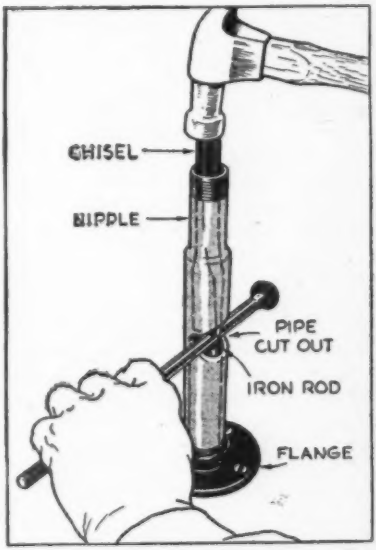




Quick Selection Collet Gauge

TO PERMIT the selection of the right sized collet for the work to be turned without loss of time mount a small home-made gauge

[*Continued on page* 154]

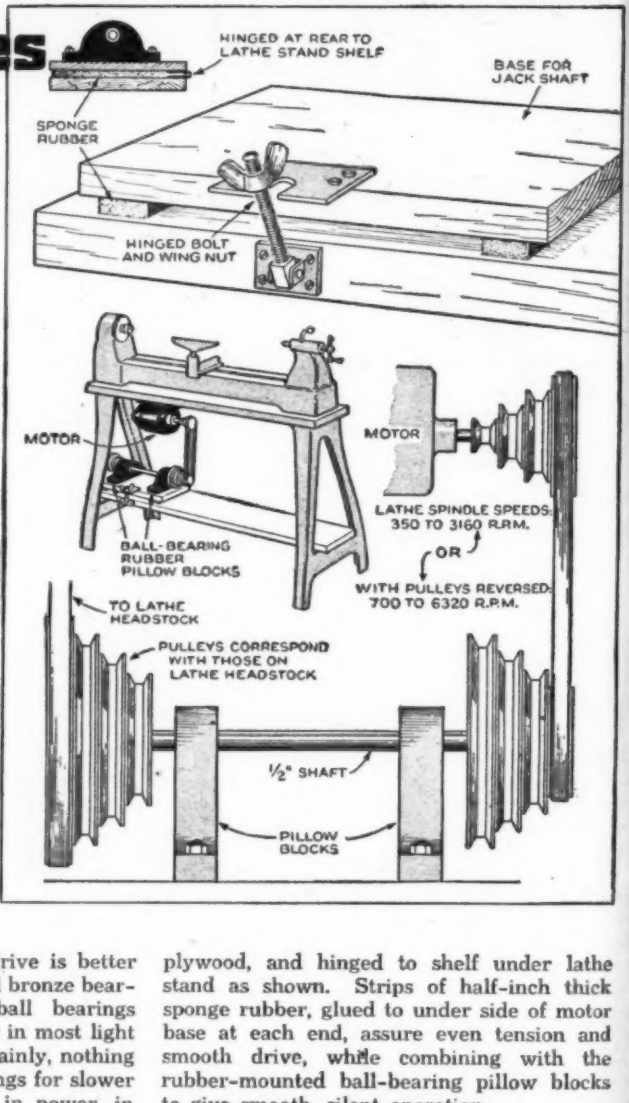


Pipe Fitting Holds Chisel

WHEN cutting rods or small metal parts this easily made fitting comes in handy for holding the chisel, leaving the hand free to hold the work. The fitting may be made in various sizes to handle light or heavy work.—*B. N.*

Improved Multi-Speed Drive For Lathes

by Clyde Baker



FOR certain special work a wider speed range than is usually provided on a wood turning lathe may be necessary; and the modern ball-bearing lathes in leading makes will easily stand speeds up to 5,000 r.p.m., or even 7,500 r.p.m. for short periods. Speed reduction is also essential where light metal work is to be done on the wood lathe, using the compound rest available on many standard makes.

In many instances it has been noted that poor judgment has been exercised in setting up a multi-speed drive, resulting in too much speed for the slower metal turning operations, and either insufficient speed, *or an insufficient number of speeds*, for very small work in wood or plastics. Moreover it is a frequent practice, for which there seems no sensible reason, to belt a *bronze* bearing jackshaft between a *ball-bearing* motor and a *ball*-bearing lathe.

As no chain is stronger than its weakest link, so no drive is better than its poorest bearings. Good bronze bearings have their uses, but ball bearings throughout are infinitely better in most light high speed machinery; and certainly, nothing is ever lost by using such bearings for slower speeds. The ultimate savings in power, in belt wear, and less expensive motors, will offset many times the cost of ball bearings.

Wishing to rig a wood lathe for a wide field of usefulness in wood, plastics, and light work in aluminum and Zamak castings, the multi-speed drive illustrated was worked out, using only ½-inch shafting, and standard pulleys.

Motor base was made of ordinary ¾-inch plywood, and hinged to shelf under lathe stand as shown. Strips of half-inch thick sponge rubber, glued to under side of motor base at each end, assure even tension and smooth drive, while combining with the rubber-mounted ball-bearing pillow blocks to give smooth, silent operation.

Loosening the wing nut on hinged tension bolt frees *both* the belts for easy shifting on pulleys, as required for various speeds.

Fafnir ball-bearing rubber pillow blocks, Series RS, were used with the ½-inch jack shaft.

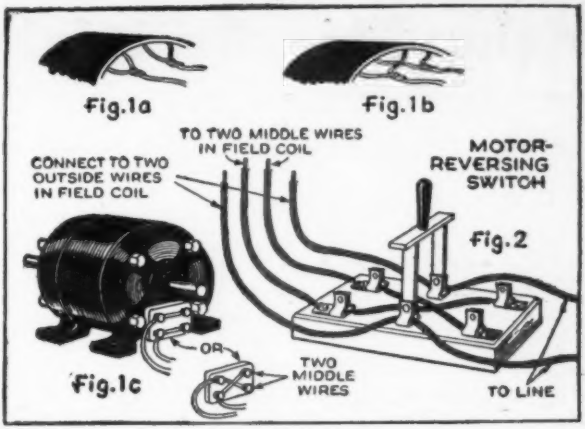
Motor pulley is Delta No. 718, belted to a

[*Continued on page* 152]

Motor Reversing Switch

TWENTY-FIVE CENTS is the price of a luxury you have always wanted, and perhaps have not felt able to buy—a reversible motor for lathe, shaper, drill-press or sander. By connecting a double-throw-double-line knife switch in the line according to these instructions, you may reverse a motor with no more effort than throwing a switch.

By removing the end-piece of the motor from which the lead-wire runs, you will note that the field-coil (the stationary outside winding) has four wires leading from it which look about like Fig. 1a or 1b, according to the direction the motor runs. The four wires may be found to terminate in four binding posts, which are "bridged" as in 1c, to control direction of rotation. If so, the motor end-piece need not be removed. Connect an extension wire to each of the four wires, marking the two middle ones (as with white wires, tracer-thread wires, or string ties). Lead them out through the hole, replace the motor end-piece, and wire them to the switch as shown in Fig. 2.



Note that the two center wires are connected to the two end terminals, and the four end terminals are connected with wires *crossing* (insulated from each other, of course), as illustrated. Test the hook-up, and if it works

[*Continued on page* 154]

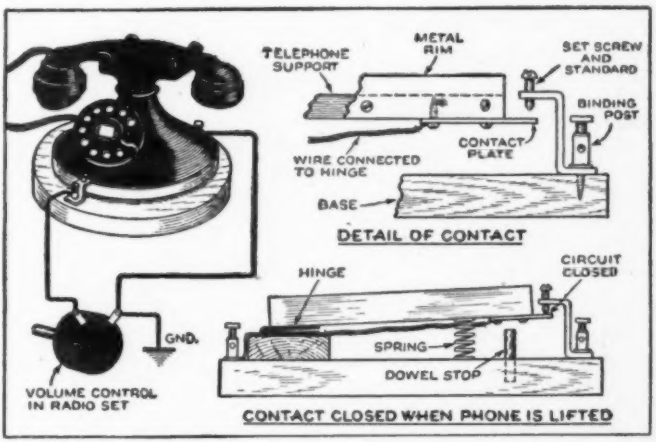
Phone Shuts Off Radio

THIS idea saves running to shut off the radio when answering the telephone. Any handy man can build it at practically no expense and it is simple to install.

Cut out two wood disks. One should be slightly larger than the telephone base. The other about 2" larger than the first.

Rim the first disk with metal to retain the phone base and paint a suitable color. Fasten a brass hinge to one side and directly opposite fasten a narrow strip of stiff metal that projects ½" out from the edge. Connect this metal to the hinge by a wire underneath the disk.

To the surface of the larger disk fasten a piece of ¾" wood to take the hinge. A piece of wire connects the hinge electrically to a binding post near the edge of the disk. This arrangement allows the top disk to be raised like a lid. The top disk is kept level when at rest by a piece of dowel that acts as a stop. The contact support and set screw assembly is shown in detail and is attached to the edge of the bottom disk so the set screw contacts the metal strip on the top disk. A binding post connects this standard to the circuit.



Place the telephone on the top disk and adjust the set screw until it clears the contact strip by about ¼". Then select a light

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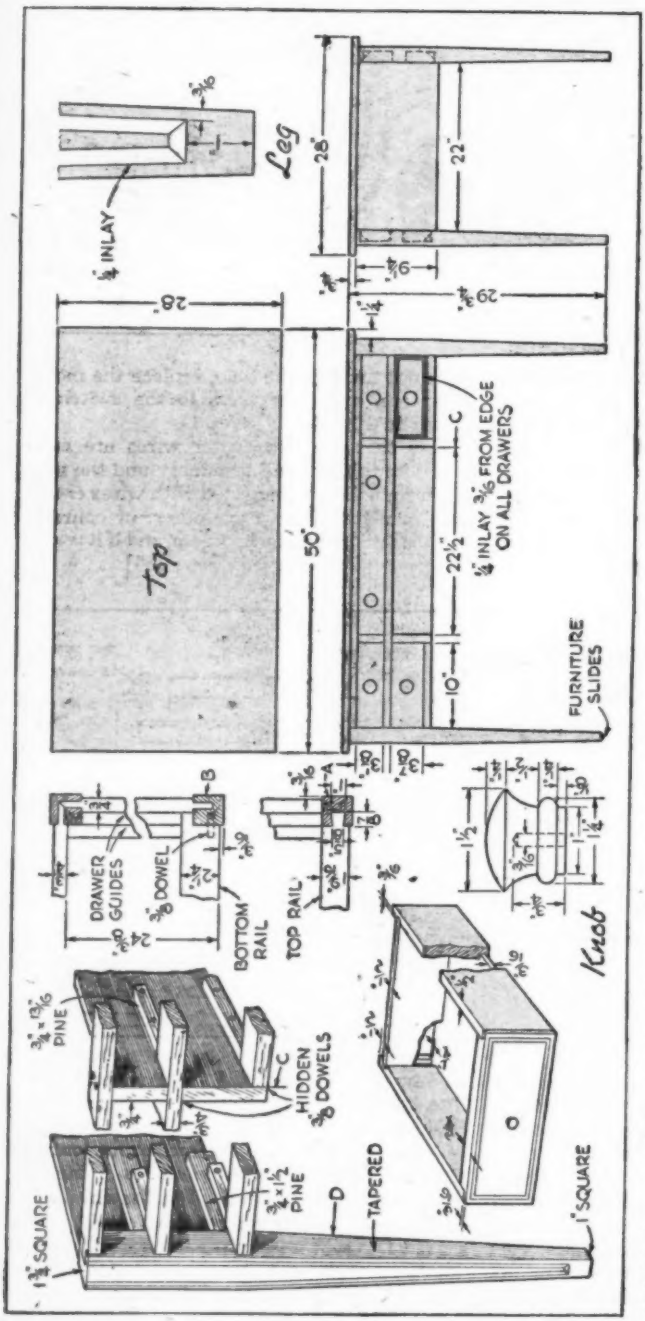
Make This Graceful SHERATON



THE charm of the Sheraton style in furniture lies in its simple lines and good proportions. Slender tapered legs, the beauty of fine cabinet woods and delicate straight line inlays are characteristic of this style.

First choice for woods is American Walnut. Honduras mahogany is a close second. Birch, stained mahogany, can be used but it is more difficult to work with hand tools and in a fine piece such as this, walnut or mahogany is recommended.

The drawings clearly show the sound cabinet construction of this desk. Cutting the mortises and tenons either by hand or by power machinery is fully treated in innumerable sources on cabinet making and need not be dealt with in detail here.

The following bill of materials are finished sizes and do not include tenons or dovetail on top front rail:

Top—1 pc., ¼"*x28"x50" (*approx. after scraping and sanding ⅛" stock)
Back rail—1 pc., ¾"x9¼"x45" plus tenons
End rails—2 pcs., ¾"x9¼"x22" plus tenons
Top front rail—1 pc., ¾"x1⅛"x45" plus dovetails
Intermediate front rail—1 pc., ¾"x 2¼"x45" plus notched ends
Lower drawer rails—2 pcs., ¾"x2¼" x10" plus notched ends
Legs—4 pcs., 1¾"x1¾"x29"
Inside upper drawer rails—2 pcs., ¾"x3⅛"x24⅛"
Inside lower drawer rails—2 pcs., ¾"x4⅛"x24⅛"
Front of upper drawers—2 pcs., ¾"x3⅛"x10"
Front of lower drawers—2 pcs., ¾"x3⅞"x10"
Front of center drawer—1 pc., ¾"x3⅛"x22½"
Miscellaneous pine stock for drawer sides and guides, and ¼" plywood for drawer bottoms.

The inlays should of course be glued into the two front legs and into the faces of drawers before the parts are assembled. One-quarter

DESK In Your Workshop

To construct a really fine piece of furniture is the goal of many a workshop hobbyist. Here is a desk that the most advanced craftsman may well be proud of, but which is not too difficult to be tackled by the less experienced woodworker.

by
Alvin M.
Youngquist

Any home would be enhanced by the addition of this beautiful inlaid Sheraton style desk, reminiscent of the days before Grand Rapids and time payments, when furniture was built of fine woods by careful craftsmen and lasted a lifetime or longer. A desk like this, purchased, would be out of range of the average pocketbook (if you could find one at all), but with a little care and patience, and very little cash layout, you can produce one right in your own workshop.

inch inlay strips of various patterns can be purchased from cabinet supply houses, or they can be made of any contrasting wood such as birch, maple, or satinwood. The pattern used on the desk illustrated was of fine alternating border strips of maple and walnut and a broader strip of satinwood in the center. The straight inlay grooves, 1/20" deep and ¼" wide can be cut with a hand or power router. The mitres at the corners and the short inlay groove at the lower end of the legs will have to be cut by hand with a chisel. Twenty-four linear feet of inlay is required.

Use a good grade of hot glue or cold casein glue in the assembly. Long cabinet clamps are necessary for gluing up the rails and legs, and for the top. The end rails are glued to the legs first. When the glue has set it will be easier to scrape and sand the end assemblies before gluing up the entire desk.

It will be noted that the upper front rail is dovetailed into the upper end of the legs. The lower front rails are secured by means of ⅜" dowels and a wood screw in the notched ends to the inside of the legs. The vertical inside drawer rails are fastened to the back rail by means of ¾"x¾"x9" strips glued and screwed in place. Before gluing up the entire desk it is advisable to have a complete trial assembly with the clamps so as to be sure that all parts fit properly and that clamps and blocks are at hand for gluing.

The drawers are of standard construction. Three-sixteenth-inch plywood works well for the drawer bottoms. The knobs can be turned out on a lathe, or similar patterns, in wood to match the desk, can be purchased. Knobs are fastened to the drawers with screws made for that purpose. Next the drawer guides of pine, whitewood or ash, are glued and screwed into place as illustrated. Five-eighth-inch furniture slides are fitted to the bottoms of the legs.

Tops are generally glued up of random width stock—6, 8, or 10 inches wide. In some cases it may be an economy of time and effort to have the top glued up and machine sanded at a wood working mill. It is rather difficult and tedious work to joint the edges accurately by hand and then to plane the glued up top perfectly flat and true. The top should be fastened in place with standard metal clips made for that purpose so as to allow for shrinking and expansion.

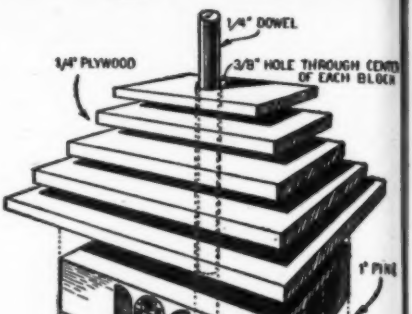
A good finish is most important. Final sanding should be with No. 0 sandpaper. The usual procedure for fine finishing should be followed—stain, filler, light No. 00 sanding, a coat of thin shellac, light sanding, followed by two or three coats of best grade rubbing

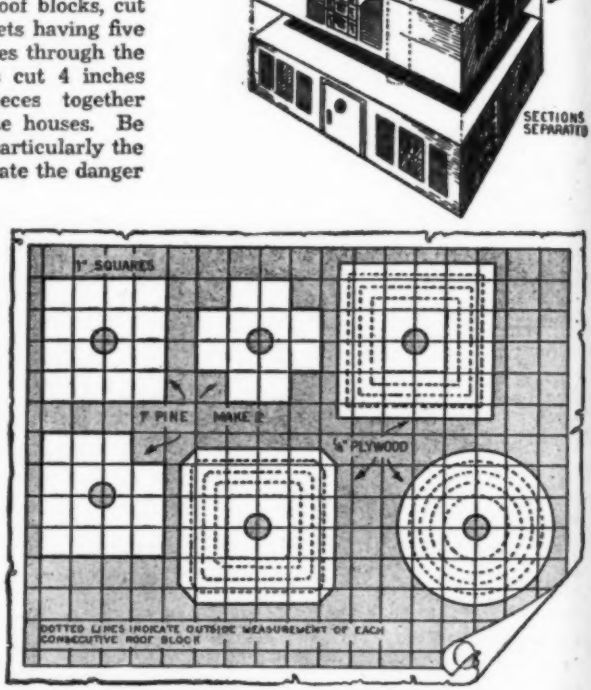
[*Continued on page* 156]

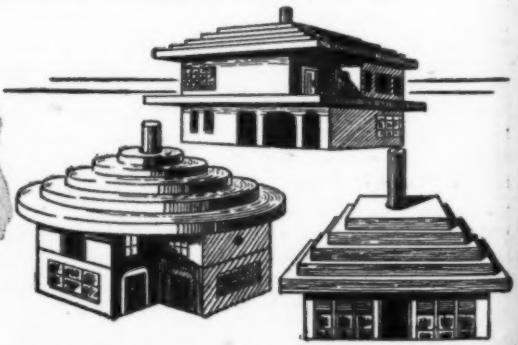
Toy House Building Blocks

HERE is a building block set from which children can construct miniature houses in modern style and considerable variety. Any half-way ambitious father can make his youngster one or more sets of these novel blocks with the greatest of ease. If Papa has a workshop the job is a snap, and even if he hasn't, a short session with a few dime store hand tools will turn the trick. So roll up your sleeves, men, and show the kids how clever *you* are!

The set consists of six blocks, which form the body of the houses, each with a ⅜-inch hole drilled through the center; the roof blocks, cut from ¼-inch plywood in three sets having five sizes each (also with ⅜-inch holes through the centers); and three ¼" dowels cut 4 inches long to hold the various pieces together and to form the chimneys of the houses. Be sure to sand all the pieces well, particularly the plywood edges, in order to eliminate the danger of splinters. First paint the 1-inch pine blocks flat white, then with enamel paint on the simulated doors and windows. An alternative would be to cut out door and window illustrations from color ads in magazines and paste them on, followed by a coat or two of white shellac. Paint one set of roof blocks blue, one set red, and one set yellow.







HANGING IVY GARDEN

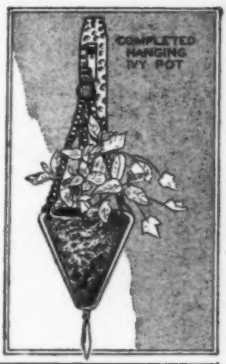
by Dick Hutchinson

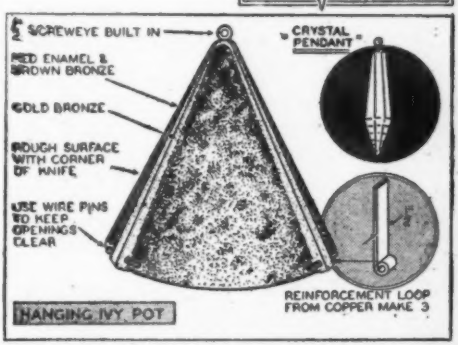
ASBESTOS paste (which may be purchased at any plumbing shop) combined with portland cement produces a material with which it is possible to produce almost anything that can be shaped by hand. The material dries very slowly, thereby allowing the craftsman ample time in which to work it into the desired shape, and when dry it becomes as hard as stone. The most satisfactory mixture for this work is 1 part by measure, of portland cement, and 2 parts asbestos paste, mixed well, and wet to make a thick paste.

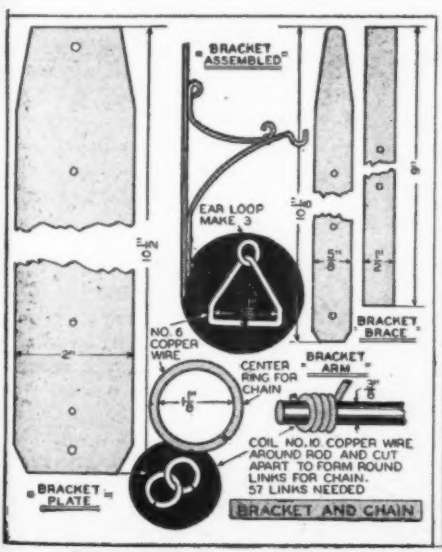
An ideal project for this material, and one which serves both a decorative and useful purpose around the house, is the ivy or flower pot illustrated. Shaped like an inverted cone, it is easily modeled around a cardboard core. It is hung, when completed, by means of chain and hooks attached to an attractive wall bracket. Holes for hooks are molded into the flanges of the pot and reinforced with copper strips, as shown.

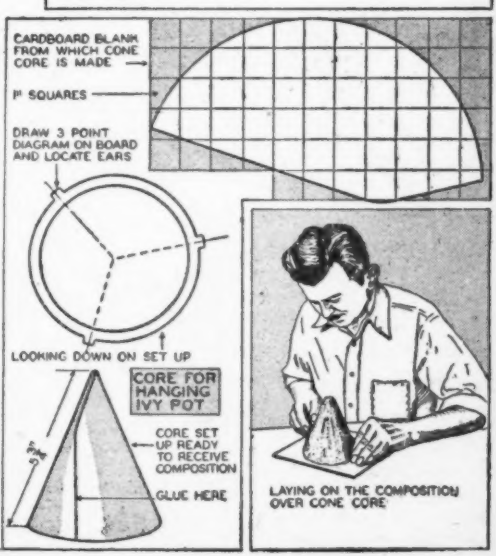
The cardboard core is set up and the pot is formed over this with a putty knife. Lay on a coat of the composition about ¼" thick. Form the reinforcement rings for the ears, and press them in place in the composition and let set for about four hours, after which the piece may be worked out in detail.

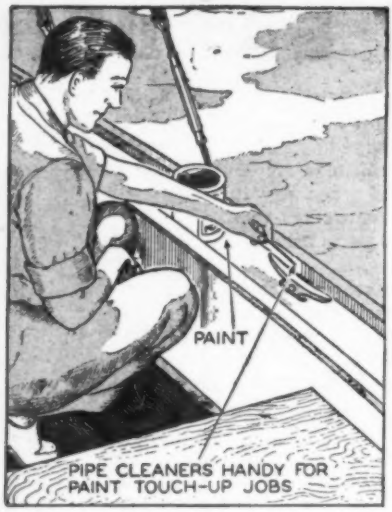
When dry enough to handle, remove the core and smooth up the inside with a little of the composition. Then place in a cool damp place so that it will dry slowly. When thoroughly dry, line the vase with two coats of asphaltum varnish. Give the outside a coat of shellac. Decorate with paints to suit. The bracket is cut from 14 gauge soft sheet copper, hammered and assembled, and all copper parts are polished and lacquered.




SCREWEYE BUILT IN
"CRYSTAL PENDANT"
RED ENAMEL & BROWN BRONZE
GOLD BRONZE
ROUGH SURFACE WITH CORNER OF KNIFE
USE WIRE PINS TO KEEP OPENINGS CLEAR
REINFORCEMENT LOOP FROM COPPER MAKE 3
HANGING IVY POT

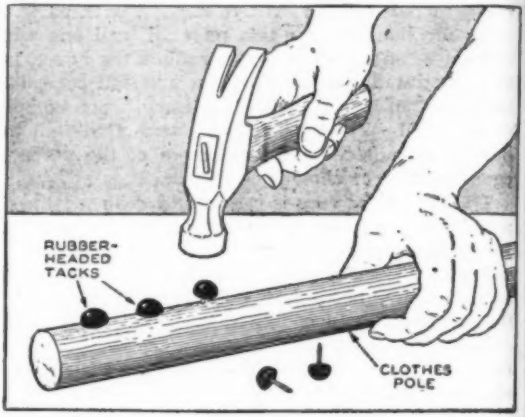

"BRACKET ASSEMBLED"
EAR LOOP MAKE 3
BRACKET BRACE
NO. 6 COPPER WIRE
CENTER RING FOR CHAIN
"BRACKET ARM"
COIL NO. 10 COPPER WIRE AROUND ROD AND CUT APART TO FORM ROUND LINKS FOR CHAIN. 57 LINKS NEEDED
"BRACKET PLATE"
BRACKET AND CHAIN


CARDBOARD BLANK FROM WHICH CONE CORE IS MADE
1" SQUARES
DRAW 3 POINT DIAGRAM ON BOARD AND LOCATE EARS
LOOKING DOWN ON SET UP
CORE FOR HANGING IVY POT
CORE SET UP READY TO RECEIVE COMPOSITION
GLUE HERE
LAYING ON THE COMPOSITION OVER CONE CORE



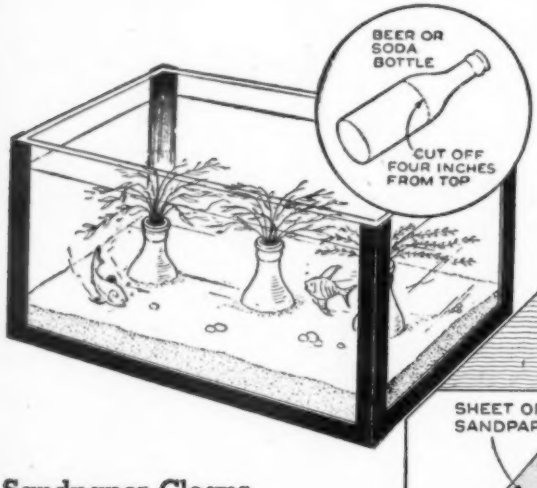
Pipe Cleaners For Touch-Up Jobs

FOR touching up chipped or flaked spots on painted surfaces around the house or on the boat use a pipe cleaner instead of the regular paint brush. Use merely the tip for a small spot, or fold the cleaner back on itself and use the doubled end for larger areas, throwing it away afterwards. With care, as good a job can be done as with a brush, and the necessity of cleaning the latter is avoided.—*J. E.*



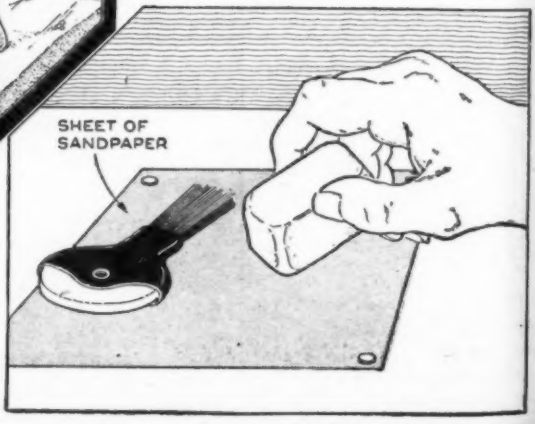
Tacks On Clothes Pole

TO OVERCOME the annoyance of having clothes bunch together in the closet, place rubber-headed tacks at intervals along the clothes pole.



Use For Bottlenecks

HERE is a way bottlenecks can be put to very good use: The upper part, or necks, of beer and soda bottles make attractive holders for such aquarium plants as anachris and cabomba. Cut the bottles off about four inches from the top and press into the gravel. Gather several bunches of the plants together, and stuff the stems into the bottlenecks.

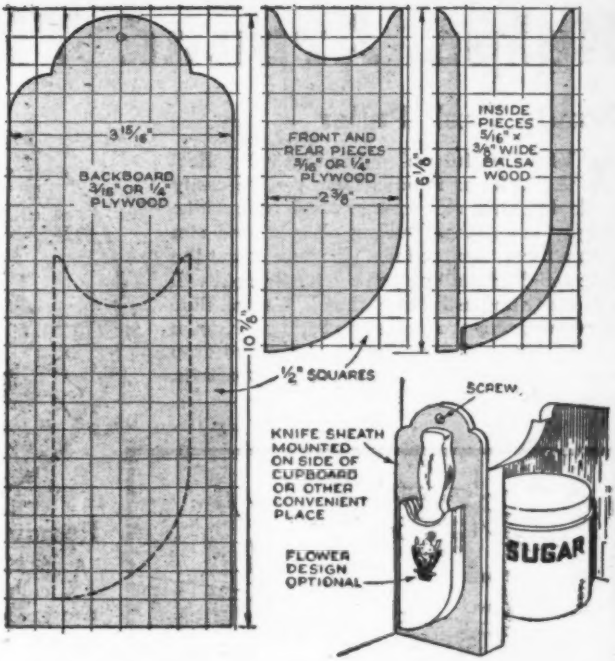


Sandpaper Cleans Rubber Erasers

AFTER an eraser or block of art gum has become particularly soiled from cleaning up heavy pencil markings, it may be very quickly cleaned by merely rubbing the soiled parts on a sheet of sandpaper.—*W. S.*

Sheath For Glass Knives

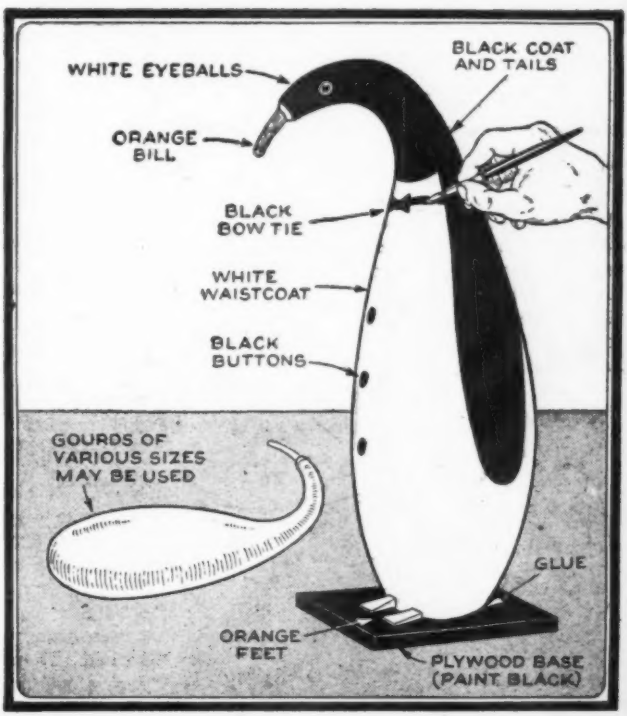
THE new glass and plastic knives now becoming popular are excellent as they have a very sharp edge and will not stain fruit or vegetables. However, they nick fairly easily, and need to be kept in a suitable sheath to prevent this. If placed in a drawer with other cutlery they are quickly ruined, and it is a nuisance to keep them in the cardboard boxes in which they are sold. A solution is the balsa sheath illustrated. This sheath is durable, yet will not harm the blade as the wood is very soft. After cutting out the pieces as shown, cement them together with model airplane celluloid cement.—*J. R. Dick.*



Novelty Penguins From Gourds

PENGUINS made of gourds which are obtained from ranchers or farmers will provide many hours of fun for both grown-ups and children. Brightly enameled and filled with sand, these novelty birds may also be used as door-stops or decorations for the family den.

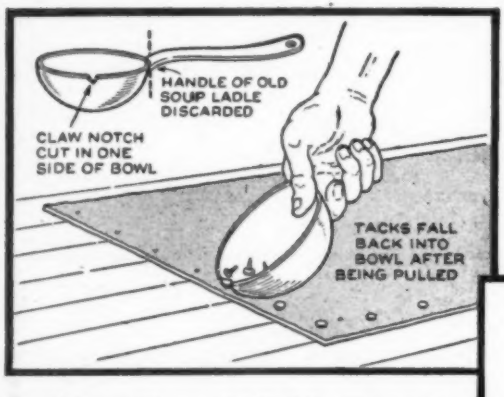
The gourds are washed thoroughly and then dried in the sun. Then the bottoms are removed and the insides taken out with a large spoon. Glue a plywood base about five inches square across the bottoms and give the gourds two coats of white enamel. After drying, mark off the lines for the coats, buttons, and eyes. These are all painted black along with the wooden base. Orange is used on the bills and feet.—*G.E.B.*



Helps Around The House

Handy Tack Puller

A VERY useful tack puller that will collect the tacks as it pulls them can be easily made from an old pressed steel soup ladle. Simply cut a tack pulling claw in one rim with a three cornered file. Be sure to cut the notch slightly flattened on the inside, so it will slip easily under the tack's head. To use, slide the claw under the tack's head and push down on the bowl. The tack will pop out and drop into the ladle. Drawing below gives details. —*A. H. W.*

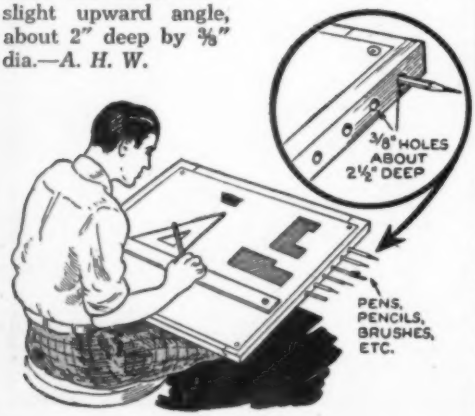


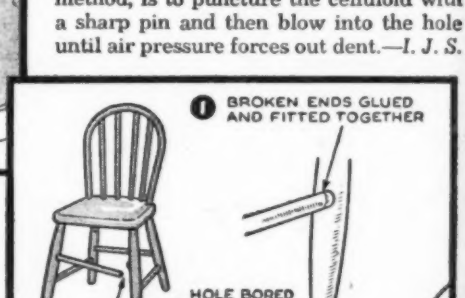
Removing Dents In Celluloid

A SIMPLE way to remove dents from celluloid dolls, etc., without the danger incurred in using the heating method, is to puncture the celluloid with a sharp pin and then blow into the hole until air pressure forces out dent.—*I. J. S.*

Drafting Board Holds Pencils

A ROW of holes bored along the top edge and right side of a drafting board make excellent repositories for pencils, pens, etc. Drill the holes at a slight upward angle, about 2" deep by ⅜" dia.—*A. H. W.*




1 BROKEN ENDS GLUED AND FITTED TOGETHER
2 HOLE BORED THROUGH LEG AND RUNG
RUNG BROKEN AT TENON
3 INSERT LONG SCREW
COUNTERSINK HOLE

Repairing Chair Rungs

WHEN chair rungs break, they usually give way at the point where the tenon enters the leg, making a repair job very difficult, as the broken tenon has to be dug out. To get around this problem, and still have a strong repair job, coat the broken ends with casein glue, press back into place and allow to set. Then drill a hole and drive a long screw endwise into the rung, as illustrated. Cover the screw head with plastic wood.

Table For House Plants

by Harold Jackson

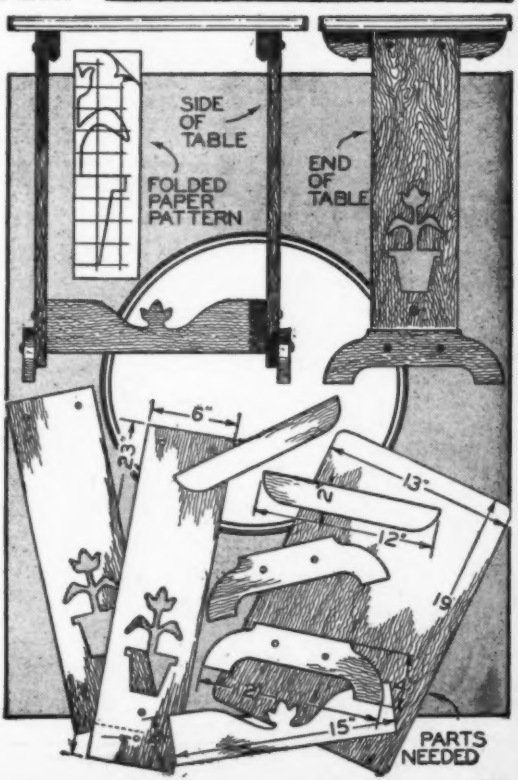
THIS table, with a number of small house plants makes a nice addition to any room. It should be built window high so that the plants will receive the most benefit of the daylight. The table is made entirely of 1″ yellow pine stock, except the top which is ¾″ plywood. The top board is 13″ wide and 19″ long and is slightly rounded off at the corners. The upright pieces are 6″ wide and 23″ long. The length of these pieces can be varied to make the table any desired height. The cleats or cross pieces under the top board are 2″ wide and 12″ long. The lower corners of these are also rounded off, as shown. The feet are made from pieces of board 4″ wide and 12″ long. The lower cross piece is also 4″ wide and is 15″ long.

Patterns for the flower pot cut-outs in the upright pieces and for the feet and cross piece near the bottom are made by the folded paper method, which insures both sides of the pattern being exactly alike. The paper is first marked off into 1″ squares.

All parts of the table are shown in the lower part of the drawing. The dimensions of all parts are also given here. The parts are assembled with wood screws. Oval head nickel plated screws with recessed washers are used. Number 10 screws are used throughout. Three 2½″ screws are used to attach each of the cleats to the under side of the top board. Use 1½″ screws at all other points. Two are used at the top of each upright piece to attach them to the cleat. Two screws are used for attaching each of the feet and two are used at each end of the cross piece. One of the screws that goes into the cross board is hidden at each end behind the foot board. The hole for this screw is indicated by the small arrow at the lower end of one of the upright pieces in the drawing.

The ends of the 15″ cross board should be perfectly square and this board should be firmly screwed in place for it is this part that braces the table and makes it stand true. A jig saw or coping saw is used to do the cut-out and curved sawing. All parts must be sanded down smooth with special attention given to the end grains. This is especially true of the

[*Continued on page* 156]



How To Steam-Bend Boat

by J. A. Emmett

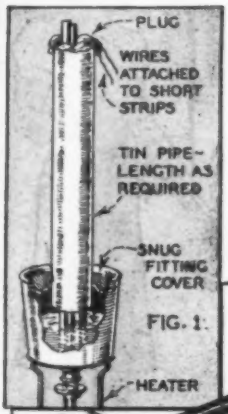


FIG. 1.

A WELL-DESIGNED round-bottom boat has many advantages, not only in the way of performance and appearance but in ease of construction, and anyone thinking of building a boat of this type should not hesitate because of possible difficulties in bending the frames. If you will secure wood suitable for bending, and will make one of the simple steaming outfits shown, you should have no trouble.

The size, length, and number of frames can be determined from the plans of any boat you have in mind. White oak is one of the most suitable bending woods as well as being easy to secure in most sections. Do not use kiln-dried stuff but favor oak on the green side to lessen chance of breakage. If you know of a small country sawmill, a few planks of straight-grained white oak free from any sap edge can usually be secured there even though you have to take it to your local dealer for ripping and dressing to size.

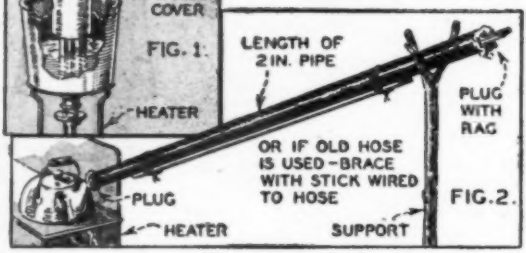
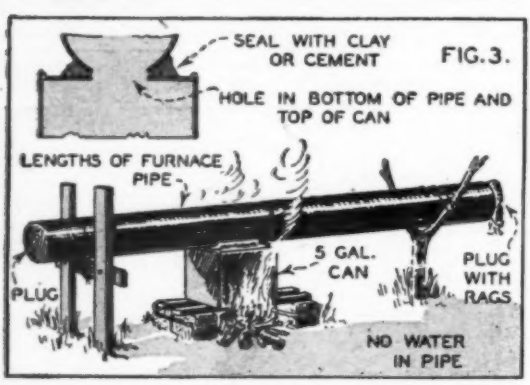


FIG. 2.


SEAL WITH CLAY OR CEMENT
HOLE IN BOTTOM OF PIPE AND TOP OF CAN
LENGTHS OF FURNACE PIPE
5 GAL. CAN
PLUG WITH RAGS
PLUG
NO WATER IN PIPE
FIG. 3.

If your specifications call for ⅜ by ¾-inch frames 6 feet long, for instance, have them sawn a few inches longer, as the extra length facilitates handling during building, avoids end splitting when fastening, and the excess can be easily sawn off later. Likewise order half-a-dozen extra frames, as you will probably break several in bending. Painting the frames liberally with linseed oil preparatory to steaming will lessen the chance of breakage.

In Figure 1 the steam box is merely a large galvanized iron pail or washtub. A disc of plywood or composition board is sawn to be a tight fit when shoved in its tapered top, and in the center a hole is bored a driving fit for a length of pipe long enough to take the frames you will be steaming. A 3-inch inside diameter pipe, for instance, either galvanized stovepipe or iron, will take half-a-dozen small frames at a time without crowding. It should be forced through the plywood only far enough to give it a good grip. The bucket can be heated on a camp-stove or over an open fire; if the latter, then preferably placed on some solid grid or base. Water can be poured in through the top of the pipe as it boils away to keep the bucket about half

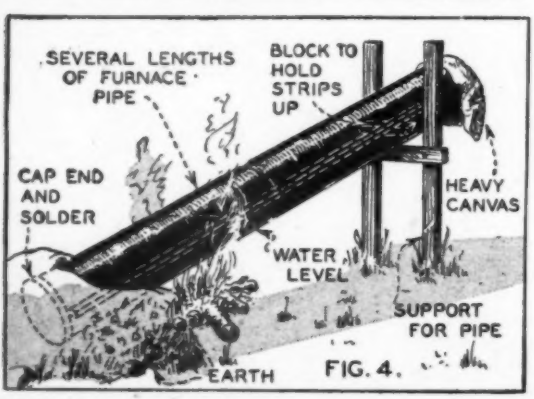


FIG. 4.

Frames

The softening of wood for bending by means of steam is not the mysterious, difficult task many would-be boat builders imagine it to be. It's really quite easy, and this article tells you why and how.

filled. The frames are dropped in until they rest on the bottom of the bucket, a rag being plugged in the top to prevent loss of steam. Some frames will be shorter than others; holes should be bored in the ends of these with wires attached for pulling them out.

There is no set time for steaming; it all depends on the size of the pieces, the nature of the wood, and the heat of the stove. Determine this time by testing the first batch of frames after a half hour's steaming. A frame, if of small size, should be ready when it will bend like a switch with the hands only and require no forcing to bring it down to the ribbands already in place about the building moulds. In the remote possibility of its not doing this, return to the pipe for further steaming, determining whether there is water in the bucket and making sure the fire is kept going briskly.

When a frame is ready for easy bending shove a fresh one in the pipe to take its place. From now on the frames should be ready as fast as you can bend and fasten them in place: they should be numbered or their position in the pipe remembered so the longest one in can always be taken out.

The same principles of steaming apply to the other simple outfits. Figure 2 shows merely a length of hose or pipe placed over the spout of a large teakettle which will give off enough steam to prepare light frames. The upper end of the hose or pipe is wired to a support, the lower end forced tight over the kettle spout.

In Figure 3 a rough 2-inch hole has been cut in the top of a discarded five-gallon oil can. A couple of lengths of large galvanized iron furnace flue pipe have been shoved together and a hole cut in the underside to place over the hole in the can. The ends are supported, and clay or cement built up to connect the holes and prevent loss of steam. One end of the pipe is capped or made tight by wiring a piece of heavy canvas over it: the frames are fed in the other with a rag used to plug this opening. Frames should be kept up off the bottom on blocks to allow steam to circulate about them with not too many put in at a time for the same reason. Water can be replenished through the regular vent.

Figure 4 shows one of the many forms of this type of simple steam box. A pipe of any kind is merely inclined over a fire built under its lower end, which must be capped tight or buried in a bank of clay or cement to prevent water escaping. In the previous outfits the pipe used merely held steam and any slight escape didn't matter, but in this the lower end holds the water. The section of frame in the water is boiled, the upper part steamed; either softens the wood sufficiently.

All these outfits are intended to be quickly

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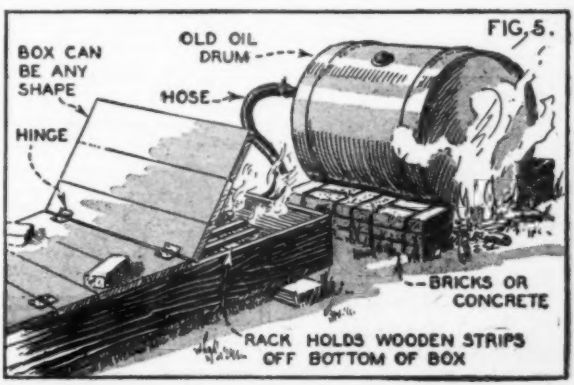
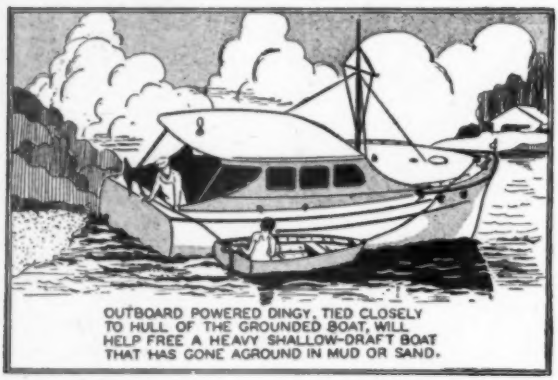


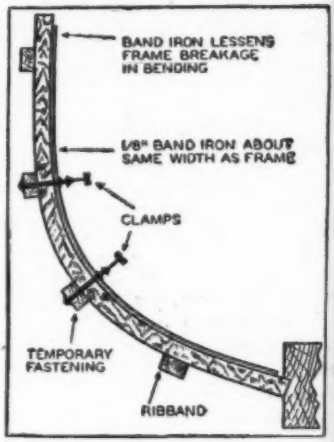
Hints For Boating Fans

Refloating Grounded Boat



OUTBOARD POWERED DINGY, TIED CLOSELY TO HULL OF THE GROUNDED BOAT, WILL HELP FREE A HEAVY SHALLOW-DRAFT BOAT THAT HAS GONE AGROUND IN MUD OR SAND.

AN OUTBOARD powered dinghy can often be used where other methods fail to free a heavy shallow-draft boat that has gone aground in mud or sand. The dinghy should be tied closely alongside the distressed vessel with bow and stern lines, outboard motor directed toward point of grounding. The action of the propeller will wash away a considerable amount of mud and sand.—*R. A. H.*

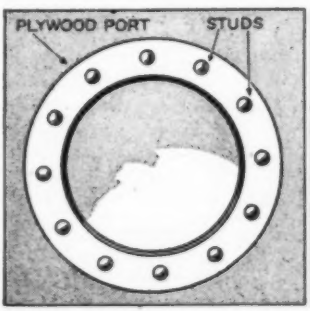


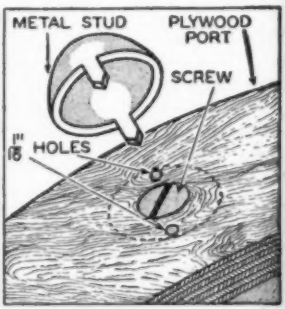
Band Lessens Frame Breaks

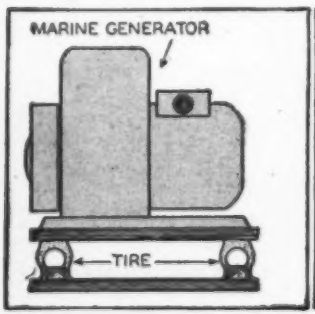
WHEN bending steamed oak frames into place have handy a few lengths of ⅛" thick band iron the approximate width of the frame. Clamp iron on top of hot frame when bending into place. It will ease compression strains in wood and cut down breakage.—*J. E.*

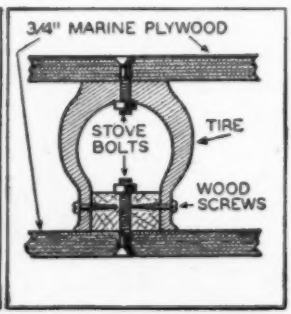
Decorative Studs On Ports

THE metal studs used to decorate leather goods make realistic rivets when applied to the plywood ports so popular in game rooms and houseboats. They may be had in brass or nickel finish and come in sizes up to ½".—*R.A.H.*









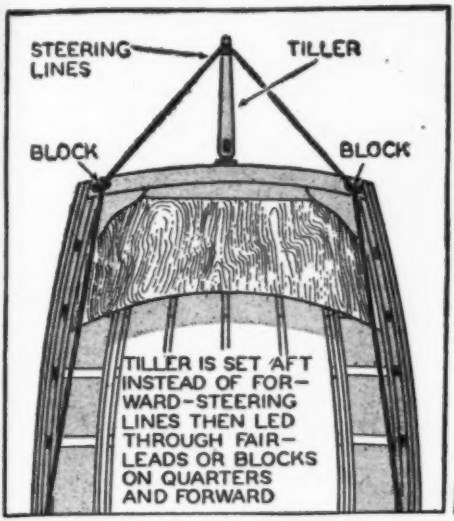
Rubber Mounting For Generator

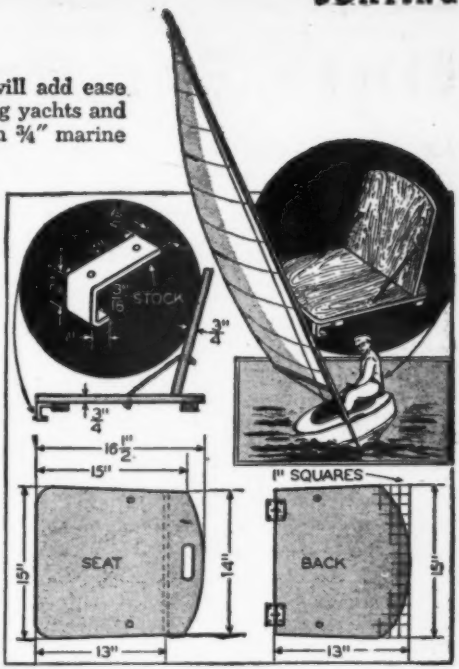
A RUBBER-MOUNTED base for a small marine generator can be constructed cheaply and easily from a discarded tire casing and two sheets of ¾" marine plywood. Four 6" sections of the casing are cut and mounted between the corners of the plywood.

Folding Cockpit Seats

THESE inexpensive folding cockpit seats will add ease and comfort to hours spent afloat on sailing yachts and motor sailors. The seat and back are cut from ¾" marine

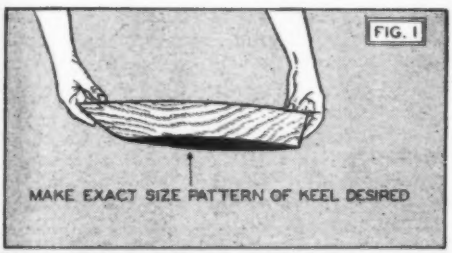
[*Continued on page 160*]

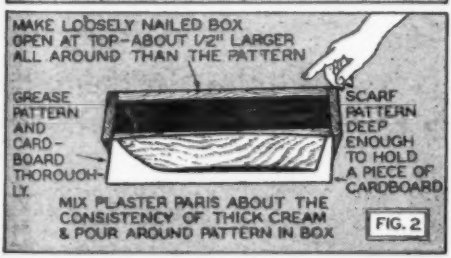

STEERING LINES
TILLER
BLOCK
BLOCK
TILLER IS SET AFT INSTEAD OF FORWARD-STEERING LINES THEN LED THROUGH FAIR-LEADS OR BLOCKS ON QUARTERS AND FORWARD

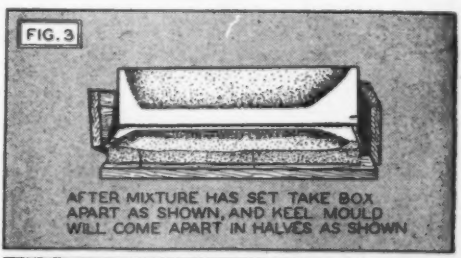


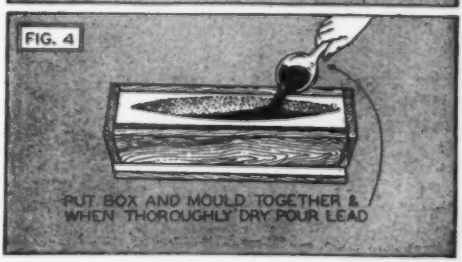
Keep Tiller Outside Boat

BOATS with small inboard engines located near amidships will find turning the tiller the opposite way to point astern most convenient. Rig steering lines from it to a wheel or lever forward or wherever desired. This will allow passengers to sit on the stern seat without being hit by tiller.—*J. E.*




MAKE LOOSELY NAILED BOX OPEN AT TOP-ABOUT 1/2" LARGER ALL AROUND THAN THE PATTERN
GREASE PATTERN AND CARDBOARD THOROUGHLY.
SCARF PATTERN DEEP ENOUGH TO HOLD A PIECE OF CARDBOARD
MIX PLASTER PARIS ABOUT THE CONSISTENCY OF THICK CREAM & POUR AROUND PATTERN IN BOX
FIG. 2



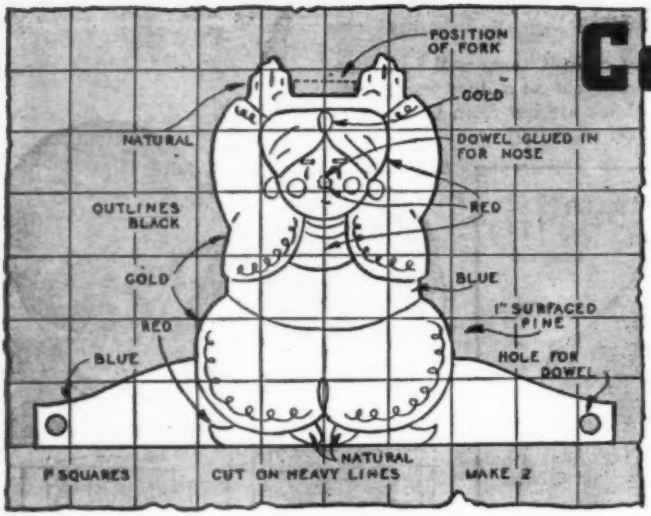


Making Keel Shoe Mould

THE drawings above and at right illustrate, step by step, the simplest correct method of making a mould for a cast lead keel shoe. The shoe in the drawings is intended for a model boat, but the same method can be

[*Continued on page 160*]

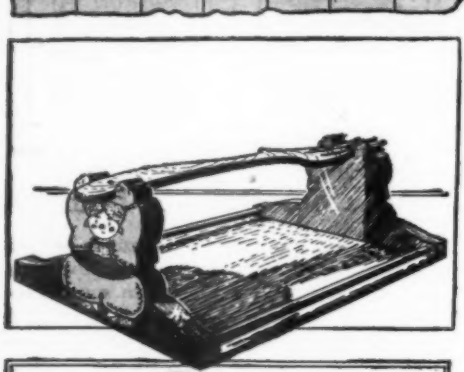
Colorful H



COLORFUL wooden serving trays are easily constructed from plywood and pine stock using ordinary hand tools.

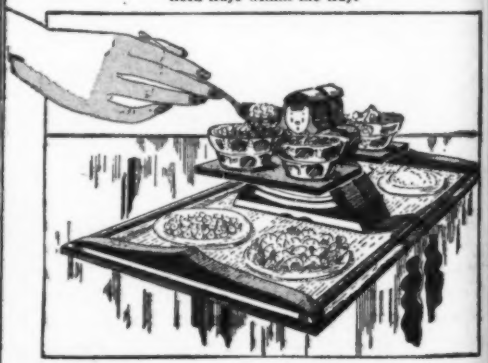
Two little oriental figures cut from 1-inch surfaced pine stock form the end sections of the tray, and hold a wooden fork high above their heads for the handle. Fasten the end sections with screws, to a piece of ¼-inch plywood 9 inches wide by 12 inches long; secure the fork in the hands of the figures with glue and screws; glue in two ¼-inch dowels for the side sections, and paint the figures as indicated on the squared drawing. Finish the bottom of the tray the natural color of the wood.

To make the tray with the figure of Neptune in the middle, cut a section of ¼-inch plywood 10 inches by 15 inches over all for the bottom; cut two end sections and two stars of ½-inch stock; the figure of Neptune from 1-inch stock, and Neptune's beard from ¼-inch plywood. Attach the end sections to the bottom with screws. Glue the plywood beard in place on the figure, and drill a quarter inch hole through the hand and base, as indicated in the illustration; then attach the figure to the bottom of the tray with



Left: Two plump orientals carry this tray's handle, a large wooden fork. Drawing above gives details of the faithful pine retainer.

Left: King Neptune dominates the tray. His trident is used to spear olives, etc. Below: The third design. Dutch girls hold trays within the tray.



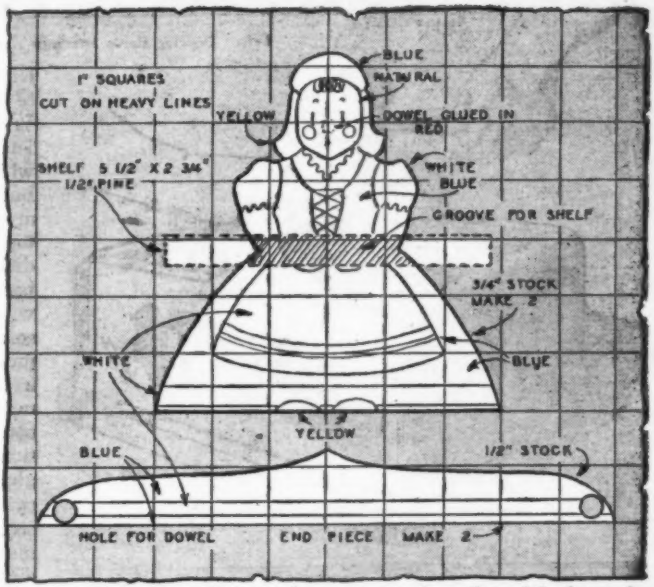
Hostess Trays

by R. L. Fairall

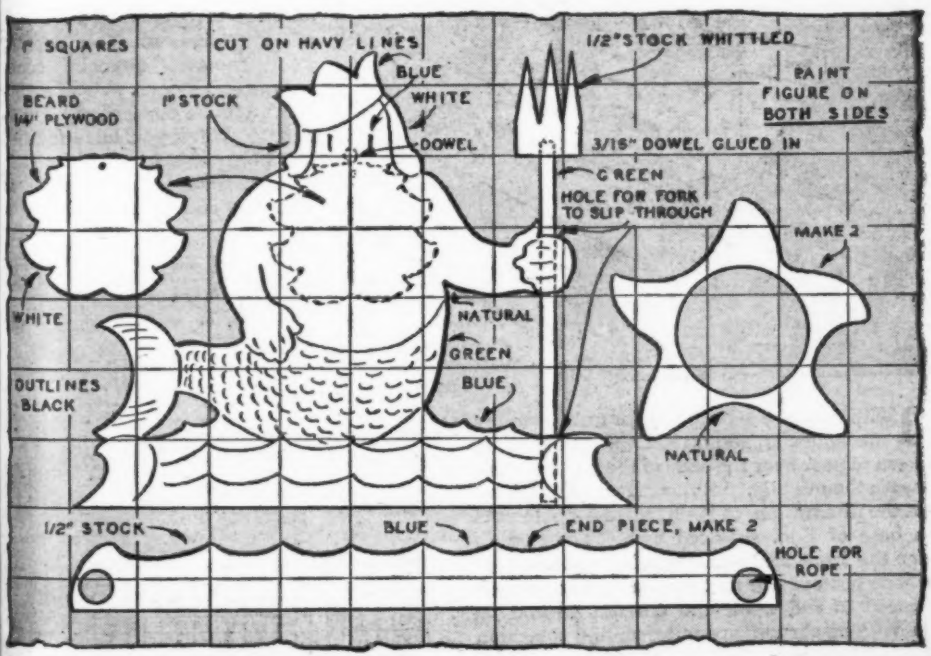
Three attractive, novel cocktail and canape trays that will please the hostess and delight the guests.

screws. Whittle a fork from ½-inch stock and glue in a $\frac{1}{16}$-inch dowel for a handle. This wooden fork slips in and out of the hand of the figure. The two stars are glued, one in front and one in back of the figure, and are made to hold a gelatin mold glass. Rope is tied in the sides to complete the nautical effect of the tray. Paint with shiny enamel as indicated in the squared drawing.

[*Continued on page* 160]

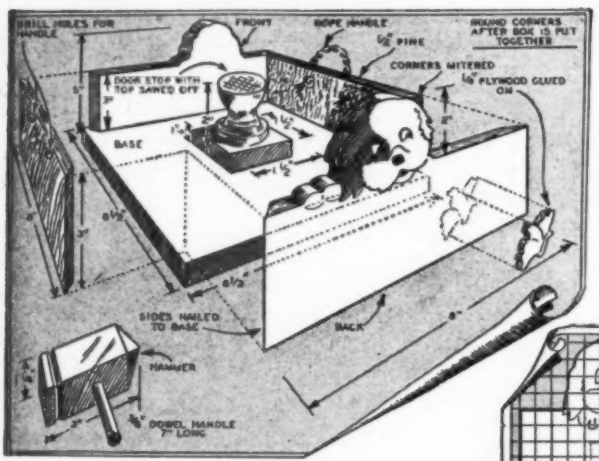


These squared drawings make it easy for you to copy the outlines of the figures, for cutting with a coping saw.



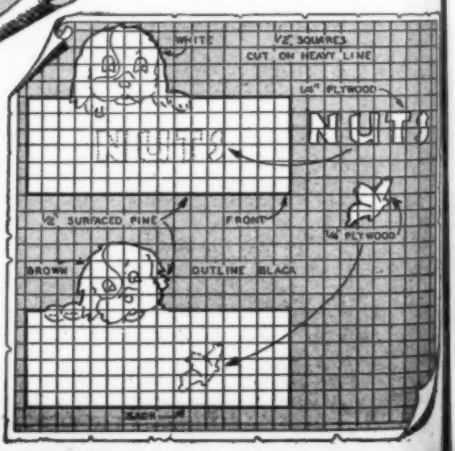
For Serving NUTS

Left: Drawing shows how nuts can be cracked on doorstop anvil of box.



THIS decorative little box for nuts is simply made, useful, and attractive. The puppies seem to peer over the ends of the box from beneath the nut pile. It is constructed, as shown in the illustration, of ½-in. surfaced pine with a base of 1-in. surfaced pine. The designs for the front and back, which have the dogs heads cut out are first drawn on paper; then traced to the wood and cut out with a jig saw. The corners are mitered, and the sides, front and back nailed and glued to the base which protrudes ¼-in. all around the box. The letters for the word "Nuts," which is on the front, and the butterfly, which is on the back, are cut from ¼-in. plywood and tacked and glued on. Holes are drilled in each side for rope handles. A wooden doorstop with ½-in. cut from the top is screwed into a piece of 1-in. pine 1½-in. x 1½-in. and set in the center of the box to crack nuts on. The hammers are made as shown in the illustration and a ⅜-in. dowel 7 in. long glued in for a handle. Round the corners of the box carefully, and smooth the whole thing with sandpaper until all roughness disappears.

If you don't like the puppy design, shown below in squares, it will be fun to make up your own, using original ideas or copying your favorite animals, comic characters, etc. A pair of squirrels might be particularly appropriate. When you have finished the box paint it white or stain and varnish. Use enamels in colors to suit on the letters.



New Products And Inventions

[*Continued from page* 10]

Ornamentation and utility are present in a recently patented lawn sprinkler. The device has the shape of a fowl, such as a duck, and is provided with a rotatable head from which a water spray issues under pressure. The body of the duck is adapted to be filled with water from a supply hose, the weight of the water in the body serving to prevent the unit from tipping. The escape of water causes the rotatable head to spin, thereby providing effective watering over a large lawn area.

* * *

A combination davenport and serving table can be made, according to a recent patent, by using a center section of the cushioned back swung downwardly as the table part. The section is mounted on hinges to permit movement from the conventional rear panel position to the forward table position. Located in the middle of the davenport, the table section is midway between two persons who can use the flat top for serving, writing, or the like. As the section swings downward, it comes to rest on the middle seat cushion and is supported by that cushion. After being used, the table part is swung back to resume its normal rear cushion function.

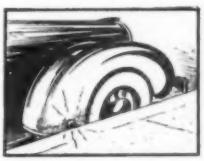
* * *

An automobile with its front wheels deep in a ditch and its rear wheels in mud, can be freed without the use of a tow car if the driver has available a newly patented releasing device. The system includes a cable which is fastened to a stake or tree trunk in front of the car. The other end of the cable is fastened to a drum attached to the rear wheel bolts. A cable drum on the front wheel is fastened in a similar manner. In actual use drums are used on all four wheels. When the rear wheels are driven in forward low speed, the cable becomes taut under the front wheel drums, and gradually lifts the front wheels up and forwardly from the ditch.

To prevent the entry of water into the nostrils and ears of a swimmer, a newly patented appliance may be used. The device includes a pair of soft cushioning pads or plugs which are adapted to project partly into the nostrils and ears. Soft rubber is disclosed as a suitable material. The plugs are attached to straps worn over the head, or the straps may be attached to a conventional bathing cap.

* * *

A scraping noise as a car drives up to a curb can be a warning of impending danger rather than an announcement of completed damage, if a recently patented curb signal is attached to the automobile. The signal element consists of a rubber base to which is attached a roughened surface. The element is attached to a fender or wheel hub, and the contact between the curb and the roughened surface causes a noticeable rasping noise. The signal can be attached by means of screws or by a rubber suction cup.



* * *

By visual observation, a patented violin bowing device permits a student to correct his technique until a perfect tone is obtained. The unit is attached to a violin and includes a channel in which the bow has free passage. By observing a marker, the player is able to determine whether or not a proper bowing procedure is being used. Correction of the stroke is made until the indicating marker assumes the desired position.

—*Morton Leese*

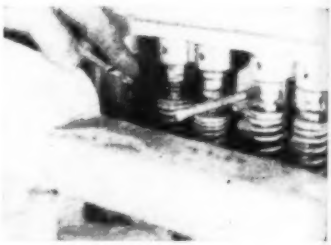
Patents Identified

Sprinkler	No. 2,241,092
Davenport	No. 2,240,748
Release	No. 2,240,570
Plugs	No. 2,241,292
Signal	No. 2,239,422
Bow Unit	No. 2,239,579

What's Your Car Trouble?

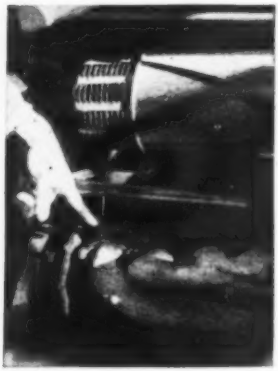
If you have a problem with your car, ask Mr. Russel. Just send stamped, self-addressed envelope for a personal reply.

by Frederick C. Russell



I never seem to be able to adjust valve tappet clearances correctly. After I finish the job the feeler gauge always shows uneven clearances. N. L.

When adjusting tappets, or even checking clearances, always run the engine every few minutes to keep the temperature up. Or do the job with the engine stone cold and adjust for cold clearances.



There is a sharp whistling noise in the engine of my car, particularly bad on upgrades. Have lubricated everything I can think of. What have I missed?

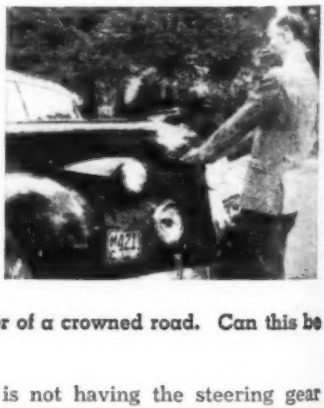
There may be an external cylinder head gasket leak but the chances are that one of the exhaust manifold gaskets is shot.

On several occasions I have been caught with failure of the starter button. What can I do to avoid being stranded? L. T. H.

On this car the solenoid control is on top the starter-motor. If it fails all the owner need do to start the starter-motor manually is to press in the solenoid plunger.

The tires of my car seem to lose pressure when I am on a trip. I always thought tire pressures increased with heat. R. R. E.

The tubes are porous.



Is there any trick in opening an alligator hood? I seem to make a real job of it. C. C. M.

After you unlock it pull it forward a little as you raise it.

There is binding in the steering gear when I try to park or steer toward the center of a crowned road. Can this be remedied? A. F.

Most likely cause of this is not having the steering gear tightly bolted to the frame. Binding of some steering gears is due to adjusting them when the wheels are not in the straight-ahead position.

Do all cars have self-lubricated rear wheel bearings? B. L.

Watch your step here! All models of some makes require lubrication for the rear wheel bearings.

Voices From The Grave

[*Continued from page* 47]

contents they want transferred to new records, and such jobs are Vincent's delight. A recent case was when Deems Taylor, well-known music critic, brought in a cylinder of his own voice, which his father had made in 1889, a recording of a song. Taylor said that he was three years old when he had sung the song, and he'd like to hear how he sounded. The record, wax on cardboard, was in bad shape.

Examining it under a microscope, Vincent discovered the grooves were square, and would require a special needle. What was more, the record could be played only on a machine made by a firm long since out of existence. Vincent was stumped, but not for long. He had the special needle made, and he borrowed a specimen of the machine from the Smithsonian Institute, in Washington. He played the old record on the museum's phonograph, then made a series of re-recordings with modern equipment. On each recording, he cut out a little more of the scratching and rumbling that marred Taylor's youthful song, until finally he had a clean-cut record which gives the song, even down to the whispered coachings of a fond father.

Many of Vincent's prize records were given to him by Thomas Edison, who, after an enthusiastic beginning, lost interest in his collection of famous voices. It is his lasting regret that the first record ever made—Edison in his laboratory declaiming "Mary had a little lamb" into the first working model of his invention—was so fragile that it was probably played only a few times, and nobody ever thought of saving it. If it had been, it's a toss-up as to who would now own it—Vincent or the Smithsonian.

There is an eerie sensation to hearing some of his records for the first time, a realization that here are the voices of people long since dead, almost legendary characters, actually speaking. The average person is inclined to agree with Vincent that hearing a person speak gives an added insight into that person's character that nothing else can do.

It is a surprise to learn that Mark Twain sounded something like Ben Bernie; that Mahatma Gandhi speaks in a dominating voice with an Oxford accent; and that William McKinley's voice was a dead ringer for Wendell Willkie's!

By putting a record on, Vincent can bring forth the voice of Woodrow Wilson who, shortly before his death, spoke out: ". . . we have done a great wrong to civilization at one of the most critical turning points in the history of mankind."

And, in these days, it gives the listener a distinct chill to hear President Harding, speaking at Hoboken after the arrival of a ship with 5,212 American dead, say: "It must not be again!"

Vincent collects old musical records, too, and has about ten thousand of them, but voices are his great love. He estimates roughly that he spends about half his considerable yearly income on his hobby. He wouldn't think of taking a motor trip without his recording apparatus.

Unlike other collectors, he is not jealous of his treasures and does not want them for his sole possession. His fondest hope is to see his collection of voices of the past, as well as recordings made of famous contemporaries, assembled and housed in a great national voice library. For years he has been trying to interest the Library of Congress, the Smithsonian Institute, the National Archives and various Senators and Congressmen in the project, but with no success. Lack of space, lack of money, lack of authority was pleaded. Rather bitterly, Vincent puts them all under the heading: Lack of vision.

Without official support, he has organized his collection under the name, The National Vocarium, in New York. What makes him particularly eager to realize the plan of a great national voice library is the fact that Thomas Edison also had the same vision and the same hope when he invented the phonograph. The instrument which took the world by storm was less a device of amusement and diversion to its inventor than a means of preserving the voices of the great for all time to come.

In 1878, Edison wrote in an article for the *North American Review*: "Henceforth it will be possible to preserve for future generations the voices as well as the words of our Washingtons

[*Continued on page* 134]

Voices From The Grave

[*Continued from page* 133]

and our Lincolns, so that they may be heard in every village and hamlet in the country . . ."

Vincent intends that, if it's in his power, the hopes of America's greatest inventor will be fulfilled. Lack of official support for the project has disappointed him, but he's not yet ready to give up the fight.

In the meantime, he's searching out and tracking down old records with all the zeal and perseverance of the true hobbyist. Sometimes there are heart-breaking instances when he traces an old cylinder down, only to find that the unknowing owners have "thrown that old thing out."

Sometimes they haven't, and then comes the thrill of playing the record and discovering some unknown voice from the grave, perhaps a once famous voice, speaking across the span of years.

If, in rummaging around in the attic or cellar, you should run across an old, unlabeled disc or cylinder, don't consign it to the ashcan . . . it may be valuable. But—if you want to keep it for yourself—don't tell a soul. Because, if you do, George Robert Vincent will probably be at your front door within the week!

Toughest Game In The World

[*Continued from page* 59]

from their haciendas and start off for home in an individual rivalry for possession of the ball.

Knives and whips were used in the rough and tumble competition to gain possession of the ball. The winner was the man who reached the hacienda with the ball, or "El Pato," in his possession. Usually large bets were placed on the outcome and often they would wage their best horses against the other fellow's best mount. Naturally, with such prizes at stake, no holds were barred in striving for victory.

After 1840 "El Pato" seemed on its way to extinction, but gradually Argentine police officers, who could play the game without fear of being arrested, started to play a modified version of the game on a regular field.

"El Pato" has been changed to a round ball with leather handles and at each end of the field there is a wooden box through which "El Pato" has to be thrown to score.

Even in this modern version of the game, "El Pato" leads as the most dangerous sport, in the opinion of any who have seen it played. Since spills and thrills are many, the Gauchos still use their rebesques, that flat strapped whip of theirs, to good effect in dislodging the ball from the possessor. The number of men on each team is varied, but usually four or five men are on a team, and since they have no uniforms, players are identified by the colored sashes tied on their arms.

Saboteur In Your Plant?

[*Continued from page* 43]

ways, too! The important fact to be considered is that President Roosevelt has placed the Federal Bureau of Investigation in complete charge of all investigative work in matters relating to espionage, sabotage and violations of neutrality. In the last war, dozens of different agencies, including local police and volunteer organizations, were investigating such cases. The result was the bungling of dozens of important investigations. In this war, all authority is concentrated in one agency, the FBI. All "tips" and reports should be made *direct* to the FBI in Washington.

For what should the workman in defense industries be on watch? Here are a few tricks of the saboteurs. Study the list and, if they apply in your particular line of work, keep an eye peeled for evidence of such sabotage constantly:

Incendiarism: The favorite tool of the saboteur. One common weapon is the thermite pencil, which looks like an ordinary pencil or fountain pen, but which has an acid mechanism that acts as a fuse and causes a load of thermite to burst into intense flame. If you see a pencil or pen apparently left carelessly behind in the shop, pick it up and investigate. Be on guard against any strange package left in the shop, or against stray sheets of wastepaper, which may be chemically treated to catch on fire after the shop is closed. Incendiary devices have been constructed so small that they fit in ordinary medicinal capsules.

Mechanical sabotage: The FBI has caught saboteurs filing almost invisible notches in the threads of an airplane fuel line, which would cause a disastrous gasoline leak once the ship was aloft. They have found fuel lines stuffed with cloth or waste. They have found foreign substances, such as emery, introduced into engines. They have found electrical wiring tampered with cleverly. They have found nuts loosened after inspection, and other methods of weakening important stress points.

Basic sabotage: If you work in a machine shop, check your machine carefully before starting to work each day. A favorite method of the saboteur is to wreck machines which are hard to replace in defense plants. The FBI has uncovered plans to place chemicals in boilers to create wholesale destruction in certain plants.

City officials should take steps to protect their cities' water, sewerage and power systems at once. Plans of foreign saboteurs seized by the FBI disclose the intention of these agents to break up such systems in an attempt to throw cities into panic.

Psychological sabotage: The FBI has discovered fake bombs made to be thrown into defense plants in order to create panic, mystery and uncertainty. Remember that in modern warfare, panic is a weapon as powerful as bombs and shells. No matter what situation arises, control yourself at all times and act logically.

[*Continued on page* 136]

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Is There A Saboteur In Your Plant?

[*Continued from page* 134]

Propaganda sabotage: Perhaps the most dangerous weapon of all. The technique of today's war places subversive propaganda highest on the list of effective weapons. By it, the way is prepared for actual troops. The propagandist in your plant or company, remember, will always be a reasonable sounding person. He will spread his mental poison slyly, so as not to arouse suspicion.

As J. Edgar Hoover, chief of the FBI, recently said.

"That there is a 'Fifth Column' in America is an acknowledged reality. That it does menace America is an established fact. That it must be met is the determination of every decent American. America has become the battle ground of foreign agents. They spin their webs of alien philosophies to ensnare America, and in darkness weave insidious plans to scuttle our national defense. To counter and attack these vicious forces is the present task of law enforcement. We have never had such responsibilities or opportunities!"

Do you think that saboteurs and spies are mostly a figment of the imagination of newspapers and magazine writers? Is it hard for you to believe that such shadowy forms exist in reality—that there is little chance of your ever seeking such a person? Then read these figures:

"If those wheelbarrows aren't here by tomorrow, I'm quitting!"

In the five years prior to 1938, the FBI investigated an average of 35 espionage or sabotage cases a year. In the fiscal year, 1940, the FBI investigated a total of 16,885! On one day, alone, 2,871 complaints were received!

Not until the war is over and histories are being written will we learn the true details of the story of sabotage in America. Naturally, the FBI is in no position at the present time to reveal the workings of secret agents here. It will be impossible, then, to point to any particular disaster and declare it to be the work of sabotage until such time as the FBI will be ready to reveal its findings. However, here is a partial list of recent disasters in America which have been investigated on the possibility that they might be the work of saboteurs. It should be noted that in none of these cases has the FBI made an arrest. These, however, are the types of disasters which should be guarded against:

Irvington, N. J.—$1,000,000 in wooden patterns, vital to fulfillment of the Barnett Foundry & Machine Co. defense contract, destroyed by fire of suspected incendiary origin.

Johnstown, Pa.—Water supply line of Bethlehem Steel Company's Cambria plant blown up.

Baden, Pa.—Four cars of eastbound Cleveland-Pittsburgh train bearing Russian government agents derailed, due to spikes being pulled from an entire rail section.

Gibbstown, N. J.—Three tons of nitroglycerin explodes in DuPont powder plant, killing two men in a blast which rocked a 60-mile area.

Los Angeles, Calif.—Vital model of new type military plane disappears from Manta Aircraft Co. office.

Kenvil, N. J.—Plant of Hercules Powder Co. blown up, killing a dozen workers and injuring 200.

Fernwood, Pa.—Fernwood plant of Paper Canister Co., manufacturing powder containers for the government, burned to ground. Three held for investigation.

New York City—British freighter, Black Heron, catches fire the day before she is scheduled to sail for Britain carrying bombers, Red Cross supplies, steel, food.

Montgomery, Ala.—$1,500,000 in military equipment destroyed in blaze at Alabama National Guard Armory.

Woodbridge, N. J.—U. S. Railway Signal Company plant, making parachute flares for U. S. Navy, blew up, killing eight men. State Labor Department calls it "definitely sabotage." On the same day, explosions occurred in plants at Newcastle and Allentown, Pa.

Los Angeles, Calif.—Plant of Reliable Aluminum Co., manufacturing army messkits, burns down with $75,000 loss.

New York City—A barge loaded with

bombers being stowed for shipment to Britain sinks in the New York harbor.

The most glaring piece of sabotage, of course, was the deliberate disabling of 25 Italian ships by their crews just before they were placed in protective custody by the U. S. government.

Although there undoubtedly will be a greater attempt to sabotage industry in America than ever before in history, the nation, through the FBI, is now better equipped than it ever has been to cope with such activity. The FBI is the leading "scientific" crime detection agency in the world.

As an example of the advanced methods used by the FBI, in a recent sabotage case in an airplane factory, mentioned above, it was discovered that someone had sawed the threaded section of an airplane fuel line in such a manner that it would have given way while the plane was in flight and caused a blaze and crash. The FBI men moved into the plant and quietly collected all the hacksaw blades in the shop, noting the tool box from which each came.

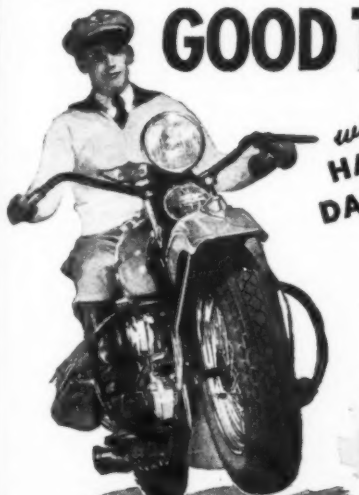
The blades and the fuel line were airmailed to the FBI laboratories in Washington. There each blade was subjected to spectographic tests which disclosed the nature of invisible filings. It was soon determined that six of the blades bore invisible specks of the same alloy of which the fuel line was made. The federal agents, by learning what men in the shop had access to these particular blades, were able to narrow down their list of suspects.

Besides its spectograph and other similiar crime detective laboratory instruments, the FBI has the most complete collection in the world of special materials to enable them to trace obscure clues. It has, for instance, 680 different types of guns, 36,822 different types of watermarked paper, 1,881 types of ammunition, samples of every kind of automobile headlight lens in the country, 3,845 tire treads, and 885 kinds of footwear. Used for reference, these specimens yield clues that have trapped hundreds of criminals.

With this highly trained and equipped agency prepared to run down foreign agents, the greatest problem is to obtain the co-operation of workmen, foremen and managers in defense factories.

The FBI, for instance, has been making a survey of factories with defense contracts with a view of making suggestions to increase their protection against spies and saboteurs. In one factory, a federal agent was shown the safe where secret plans were kept—and discovered that alongside the safe, pasted on the wall, was the safe's combination!

"It is not necessary for the citizens to take the law in their own hands unless and until law enforcement breaks down," Mr. Hoover said recently. "That, it will not do!"



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I Flew My First Time Up!

[*Continued from page 39*]

in their first trip in an Ercoupe, they almost jam their puppies through the floor.

Boyajian was right about one thing, though—as soon as we gained altitude on that first flight, we began to get away from the bumpiness that reminded me so much of a ride in a speeding motorboat. By the time we had climbed 2,000 feet, the air had become smooth and we sailed along without a quiver.

At Boyajian's suggestion, I did finally manage to lose some of my stiffness. My spine seemed to loosen a bit and, with an attempt at nonchalance, I eased back on the cushions and stretched out my long legs. We were climbing farther and farther away from the map-like landscape below.

Suddenly I was jolted into rigidity again as the whole ship seemed to pause for an instant and plunge. Desperately and automatically, I yanked back on the wheel in an attempt to regain our climbing position.

"Easy! Take it slower!" Boyajian yelled. "That was just an air pocket. You don't have to worry about things like that. This ship will come out of those things all by herself."

Mmm. m . . m! Maybe so! But I noticed my back was all taut again. I had begun to perspire a little, and my hands were sweaty as I gripped the wheel with renewed vigor. Boyajian, the cut-up, just grinned.

"Go ahead, enjoy yourself!" he urged. "But just remember one thing—never do anything in jerks that way. If you seem to be side-slipping or plunging, get back on your course as smoothly as possible. You don't have to twist and yank that way."

After awhile he suggested leveling off a bit. He showed me the altimeter, which registered 3,000 feet, and the needle of the climb indicator, which showed that we still were on the way toward the sky.

"From now on," he said, "just keep your eyes on the horizon and make sure you keep the nose about four inches below it—that will keep you on a level course."

"How about watching the indicator?" I asked. "Seems to me that would be easier than measuring four inches." I never was much good at mathematics.

"Okay, Lindbergh," he smiled. "Do it any way you like."

We were pretty far out on Long Island by this time, and I had begun to pick out recognizable landmarks—Jones Beach, Bethpage State Park, the Republic Aviation Company's plant at Farmingdale. It was then that Boyajian suggested—literally and figuratively—a new twist.

"Now watch me," he nodded, taking the wheel for the first time since we'd left the ground. "I'm going to make a turn; then I want you to make one."

He edged the wheel slowly to the right—the side I was on—and all at once I was looking over my right shoulder—not at the far distant Jones Beach but—at God's green earth, 3,000 feet away! The wing on my side was at a 45 degree angle with the ground, and we were banking in a neat turn. A second later we had straightened out and were heading back toward Roosevelt.

"Now you try it," Boyajian said. "Just remember to do it slowly, taking an easy one at first, and be sure your nose maintains that four-inch level."

I did what he said—and it was a pip! I did it again, and again and again. In a few minutes I imagined I was Eddie Rickenbacker, as I twisted and turned, first to the right, then to the left.

"Now," Boyajian said, "I'm going to show you how you'd go into a spin—if this plane weren't spinproof."

I might mention here that one of the few fears I'd had about flying was that it would make me sick. I used to keel over and grow dizzy, in my boyhood days, if someone even mentioned riding a street car, swinging in a swing, or catching brass rings on a carousel. So far this morning, though, I hadn't felt a twinge, and I was about to conclude that flying was just what my tummy needed, when—

Plu u u . . . uPP!

We went plunging nose first toward eternity, and my insides did a perfect loop-the-loop. Just as suddenly, we pulled back to a level position, and then into a climb.

Boyajian throttled the engine down till the prop could be seen turning easily ahead of us, at the same time pulling back on the wheel till it pressed against our chests. The nose climbed toward the sky and hesitated.

"Now here," he yelled, "is the perfect position for a stall, and then a spin. Notice though that our nose holds its position on the horizon and our wings don't fall away the way they would if this were another type of plane."

Even though I was battling my first traces of nausea, I grinned weakly and agreed it was all pretty wonderful. We were making perhaps 40 m. p. h., and quivering ever so slightly. I guess Boyajian would have liked to have had me try that trick, but I preferred the turning and banking stuff. I took the wheel and he pulled out the throttle.

"Well, that's it!" he called. "If you know your way home, go right to it."

On the way back, I got pretty frisky again, did a few more turns, climbs, and plunges, and proved to my stomach that it wasn't going to get me this time. In a little while we could see the field.

At Boyajian's directions, I shoved the wheel forward, throttled down the engine and drifted in for a landing. It seemed as if we were moving very slowly, and I began to moon around again at the view of things below as seen from up above.

"Come on, now, pay attention!" Boyajian urged. "This is the most important part of the flight.

I Flew My First Time Up!

Above all, you have to keep an eye open for other planes coming in and taking off. How about it—see anything?"

I looked overhead and to both sides. Everything seemed okay to me.

"Be sure, now!"

I looked again and said I was sure.

"Well, how about that fellow down there?"

I followed my companion's gaze and noted .. dark monoplane just skimming over the rooftops toward the field below us. All my life I had come to look for aircraft before the white backdrop of the sky, and, from this new angle, the ship below had escaped my attention completely.

The other plane finally touched the runway and shot off toward the other side of the field. Meanwhile I followed Boyajian's directions and kept the Ercoupe on a steady downward path. The nearness to the earth made me realize we were going faster than I thought, and as we skimmed the tops of the hangars, I was certain we were off to the races. Actually, we were doing about 40.

The landing itself was a breeze, and I felt no better about it when Boyajian informed me that I could have taken my hands right off the controls if I'd wanted to—the ship would have landed itself. We touched with considerable of a jolt, but no more so than we would have in a flivver if we'd been driving across a ditch.

In a few seconds we had crossed the field—the ship needs a landing run of only 200 feet—and Boyajian finally braked us to a stop. It was as easy as that!

My ears roared for about ten minutes after I'd climbed out of the snug cabin, but that was nothing to the roaring in another part of my skull. This latter seemed to be a hundred little voices, repeating, over and over again, Boyajian's words before we took off.

"You're going to want one of these ships some day—better order it now!"

About 45% of United States steel exports in 1940 went to the United Kingdom.

About one physicist in four in the United States is now working on national defense problems.

Portugal, says the U. S. Department of Commerce, is apparently the world's leading producer and exporter of cork.

Eight-sided revolving libraries as tall as 60 feet were built in some medieval Buddhist temples to house the numerous scrolls.

Possibility of substituting wood for steel in superstructure of railroad freight cars is being investigated by the Association of American Railroads.

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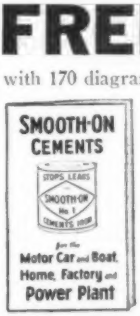

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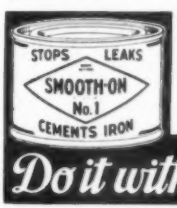

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Secret Agents Of The Skies

[*Continued from page 63*]

Emergency Corps, sponsored by the A. R. R. L., to take over all communications in disasters and emergencies of any kind—including air raids and military invasions.

Supplementing the work of two other networks, the Naval Communications Reserve and the Army-Amateur Radio System, both of which have been active for several years, the new Emergency Corps divides the nation up into districts, each with an Emergency Co-ordinator or key station.

Every Sunday night, Richard E. (Dick) Nebel, in charge of the New York City-Long Island district and a typical Emergency Co-ordinator, sits down at the key of his station, W2DBQ-WLNB, at 1104 Lincoln Place, Brooklyn, and sends out a general call to other operators in his area. By prearrangement in this periodic drill, he announces that a mock disaster has occurred.

"Waves of enemy planes bombing South Shore of Long Island," he taps out. "Huge fires started, many civilians killed and wounded. All stations in area notify this station of needs."

As Nebel goes off the air, the other Emergency Corps operators come back in reply, one by one, in prearranged order.

"Blaze out of control at Southampton. Chemical trucks needed from Nassau." This message comes from George Graveson, at W2LR in Amityville.

"Twelve-story building devastated at Hempstead. Casualties mounting. Need ambulances from Queens." This is Gilbert E. McDonald at W2CHK in Rockville Centre.

"All trunk lines cut in Jamaica. Western Union requests we handle urgent messages to Washington." Howard Smith is reporting from W2GDF at Jamaica.

"Long Island Railroad express derailed one mile West of Lynbrook. Wrecking crew needed," reports George Gaynor from W2AZM, Rockaway Beach.

The instant the last report is in, Nebel goes to work, acting to fill each urgent request for aid. Coming on the air again, he contacts W2CHK at Rockville Centre and asks him to notify Nassau County Police of the need for fire-fighting chemical trucks at Southampton. Next contacting W2GDF at Jamaica, Nebel relays the request from Hempstead for Queens County ambulances. Then, asking W2GDF to notify the Jamaica superintendent of the Long Island Railroad that a wrecking crew is needed near Lynbrook, Nebel stands by to take the urgent Western Union messages for Washington.

Such weekly message-handling drills culminate in an annual field day, at which members of the Emergency Corps take their self-powered portable equipment to remote and isolated spots for testing. More than 1,500 groups participated in the national event last June, the only day of the year during the present emergency when the FCC will permit use of portable equipment.

"Let me read that MECHANIX ILLUSTRATED article on camouflage, next!"

In many cities where emergency defense programs already have been launched, such as Los Angeles, Portland, Oregon; Oklahoma City and Boston, officials are working closely with the Amateur Emergency Corps. In recent air raid warning drills conducted by the Army during mock warfare on Long Island, civilian spotters recruited from the American Legion worked with "hams" in reporting the approach of "enemy" aircraft.

Radio amateurs already have demonstrated that they are capable of taking over commercial communications in an emergency through their services in more than 50 major disasters since 1919, including earthquakes in California, floods in the Mississippi Valley and the New England hurricane of 1938. During the latter disaster, two "hams" in Westerly, Rhode Island, stayed on the air for 56 hours at a stretch, using only batteries for power. Close to 1,000 messages passed through their hands, calling for food, clothing and drugs and notifying relatives of rescues—and deaths. Instead of a hurricane, the emergency might well have been an air raid; the unflinching service of these amateurs would have been the same.

Many amateurs already have entered the communications services of the Army, Navy and Air Corps, where they are preferred over other applicants because of their experience. While the average raw recruit requires 12 weeks of formal

Secret Agents Of The Skies

schooling and a year or so of actual field operating to be of real value, an operator who has had a moderate amount of "ham" experience soon measures up to military requirements. Members of the Naval Reserve and Army-Amateur System already are familiar with Government procedure and many now on active duty have won commissions.

Among those amateurs now in the armed services, a great number have been selected to supervise the training of draftees and recruits in communications duties.

Long before the present national emergency, a 41-year-old radio amateur and high school teacher in Olathe, Kansas, voluntarily was aiding ambitious youths to qualify as licensed radio operators. For the last 10 years over his station, W9BSP, Marshall H. Ensor has conducted code lessons nightly. In May, he was selected to receive the annual William S. Paley Award, bestowed by the president of the Columbia Broadcasting System and the highest honor in the amateur radio field. He was chosen as having "contributed most to the American people" in preparing men for communications posts vital to the national defense.

Still another defense activity by "hams" is the free message service they are supplying for the draftees in Army camps and the folks back home. In some areas, local amateurs are taking traffic from the boys in camp and routing it over the amateur net works, while in other localities—particularly in the National Guard encampments—"hams" among the conscripts have set up their own stations inside the camps. Needless to say, those amateurs who operate these outfits quickly find themselves highly popular among the men in camp. Not infrequently they are able to render important service to the trainees and their families.

At Camp Forrest, Tennessee, Capt. George M. Simmons of the 58th Signal Battalion spends hours each evening, after his strenuous day's duties as company commander, transmitting personal messages for trainees over his amateur station, W4HHY.

In the event that the United States enters the war, responsibility for planning the functions to be performed by amateur radio lies with the Amateur Radio Committee of the Defense Communications Board, comprising representatives of the amateur groups and the Government agencies.

But whether this nation's destiny is war or peace, American "hams" are doing their part to defend their country.

India suffers more than any other land from hailstorms.

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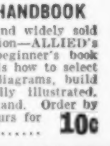

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Lifeline Under Polar Seas!

[*Continued from page 58*]

advances in submarine design have been made, and there seems to be little doubt but that the plan is feasible.

The British have some data to go on as a result of the ill-fated attempt of Sir Hubert Wilkins to make just such a submarine voyage in the summer of 1931.

Sir Hubert obtained an ancient submarine from the U. S. Navy and fitted it out specially for such a trip. He encountered bad luck from the first. His submarine, the *Nautilus*, had engine trouble crossing the Atlantic to Spitzbergen, and one engine went out completely.

The Wilkins expedition arrived at the Arctic Circle so late in the season that the seas were already beginning to freeze over. On the submersible's first—and only—dive under the ice cap, an elevating rudder fouled on a piece of ice and was broken.

Wilkins was subjected to much ridicule as a result of the trip of the *Nautilus*, but the fact remains that he did obtain data which undoubtedly will prove valuable to the British. For instance, a simple guard system around the elevating rudders and propeller would eliminate the danger of ice damage which Sir Hubert experienced.

Wilkins' submarine adventure, too, showed up the fact that special heating and ventilating equipment would be necessary to cope with the intense cold of the polar seas. Wilkins discovered that there are "layers" of cold in the water under the ice cap. His information on this matter is surely in the hands of the British.

Wilkins' failure was due chiefly to the fact that he attempted to carry out his expedition with a delapidated submarine which had already been declared obsolete by the U. S. Navy. The simple fact that he was able to make the Arctic Circle and perform one dive under the ice cap with such equipment argues in favor of the success of the British venture. Submarines equipped with today's improvements should have little difficulty performing the feat.

Another argument which has been advanced in favor of the submarine cargo method is that cargo-carrying ships under the sea would be much more difficult for enemy raiders to spot.

During World War 1, German U-boats were able to make the trip to America through the British blocade and take on cargoes of crucial war materials which the Kaiser's war machine needed.

The Russians recognized the fact that a polar route would cut distances as long ago as 1937. In that year, Russia set out to establish an aerial trade route over the North Pole. The Russian flyers, Alexander Belisakov, Valeria Chkalov and Georgi Baidukov flew over the Pole from Moscow and landed at Oakland, Calif., to demonstrate feasibility of the route.

A study of the accompanying map will show the manner in which the path over the top of the world reduces navigation distances.

Experts have pointed out that by using this system, the British would be able to shift the greatest part of their merchant fleet to the Pacific, out of danger of raiders based on European ports now in German hands, and could release numberless destroyers and other war vessels now in convoy service for active war duty.

Tacky The Tattle-Tale

[*Continued from page 53*]

a six inch drop every minute. Engineers have been about five years perfecting it.

Aside from recording the above incidents in the life of contemporary drivers, the Tachograph is also a speedometer. It records an engine's starting time. It flashes a red danger light when the driver exceeds the predetermined speed agreed upon with the boss. It records time and mileage of such excess. It tells the speed changes made . . . which makes for more even driving, a saving in fuel, a factor in safety. It shows how often and when an engine is left idling. Since each chart records a twenty-four hour run and can be filed for future reference, it furnishes legal exhibit *A*, should litigation arise over any trip.

In order to install a Tachograph, one simply removes the speedometer from the dashboard and installs the new invention. It connects with the speedometer shaft. Leads connect with ignition and dash light circuits. The sealed in chart is motivated by the clock. Recordings are made by three stylii. Two are driven by the speedometer and odemeter mechanism. These record number of miles traveled and speed. Vehicle vibration operates the third and indicates whether engine is stopped or running. Since the chart is locked in, a dishonest driver might get the idea of disconnecting the leads; but there's nothing he can do about stylus number three!

As the writer gazed upon this gadget, the more the wonder grew that one little instrument does all the things this can do. It's polished face measures only four by five inches; it's two inches deep. I anticipate the day when Tachographs will not only be offered to truckers but will actually become standard equipment on the family car.

One kind of shining cloth produced in fourteenth century Italy was made by tanning leather from the embryo of a calf, covering it with thin gold leaf and cutting it into thread strips to be woven with linen and silk threads.

The first of July, the U. S. Army was using about $750,000 worth of food a day.

Drugstore Farmers

[*Continued from page 51*]

But, it isn't as easy as it looks. Virtually no one but an expert can undertake to grow such a specialty crop as a drug, and even the experts often go awry. Dean Searles, for example, of the University of South Dakota, planted all ten of his seeds in the Dakota soil and they were given the scientific care possible only in the experimental gardens of a great university. Yet, of the ten seeds, six died because the growers lacked the necessary knowledge to tend them properly.

In the case of ephedra, however, there are other arguments against its general cultivation by farmers who are without adequate training in this particular field of agriculture. There are 100 different types of the plant, for example, only a smattering of which are commercially valuable. If the plant does not have a high alkaloidal content, it is valueless to the drug industry, and the farmer who has risked his time and money to grow it is a candidate for bankruptcy.

Probably the leading exponent of the domestic cultivation of foreign drugs is Dr. C. C. Albers, of the University of Texas. Dr. Albers has devoted almost all of his time since the start of the present war to experimenting, in all kinds of soil and atmospheric conditions, with the growing of drugs which may soon be missing from American markets because of the difficulties now involved in international trade.

The professor, a raw-boned Texan who looks as though he could step right under a straw sombrero and pass for your idea of the typical farmer, has a laboratory that's jammed to the spigots with weird roots, herbs, growing vines, seedlings and other forms of plant life. When he isn't teaching, he is continually toying with retorts, test tubes, Bunsen burners and the like. To date, he has been able to produce the following:

Aconite, a drug which comes to us from the Middle European countries and is used as a cardiac depressor.

Acacia, a gum arabic from Africa used locally as an emulsifier and paste.

Belladonna, another European product which is widely known in America as an eye dilation narcotic.

Physillium Seed, grown in France, Spain and parts of India, and used as a base for laxatives.

Corriander, a flavoring ingredient grown—until Dr. Albers went to work—exclusively in Europe.

Senna Leaves, for use in laxatives and grown, heretofore, in India, Africa and Arabia.

Licorice, the well-known flavoring agent used in cough syrups and similar nostrums, which we commonly import from Russia, Spain and Turkey.

Dr. Albers, however, is quick to point out that his drugs have been grown entirely experimentally and with no thought of commercial profit at the present time. He did not wish to go on record as urging farmers to forsake their present crops and go whole-hog into the business of raising

[*Continued on page 144*]

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Drugstore Farmers

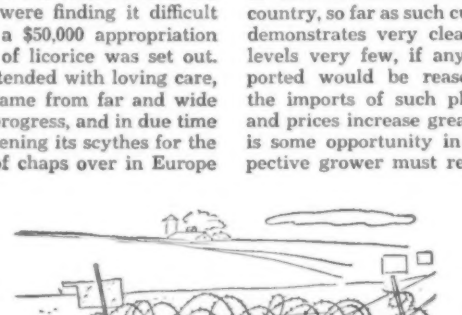
[*Continued from page 143*]

drugs. Such a step, without first making a complete study of the drug market, admittedly would be the height of folly, and, as a matter of fact, there are cases on record where even experts in the drug industry have lost their shirts because of their failure to use caution in growing drug plants.

There was the Philadelphia firm, for example, whose scientists decided, during the first World War, that it would be smart to raise some of the drug plants which they were finding it difficult to import. Accordingly, a $50,000 appropriation was secured and a field of licorice was set out. For weeks, the crop was tended with loving care, pharmaceutical experts came from far and wide to examine and note the progress, and in due time the company began sharpening its scythes for the harvest. Then a couple of chaps over in Europe heaved a monkey wrench into the machinery.

They got together and signed a peace treaty.

In less time than it took to mutter "Well, I'll be hanged," there was enough licorice being imported in this country to ease the coughing spells of every citizen, and at a price that made the Philadelphia firm's product resemble a pearl of great price. As a result, the Pennsylvania boys didn't even bother to gather their licorice into barns, and the 50,000 photos of General Washington went up in dense black smoke.



"What barricade?"

Of course, a large, well-established drug firm could afford to write off an investment of that kind, but their experience has made them warn present day farmers to beware the mirage of quick profits from drug farming. As one wholesale druggist remarked this spring:

"If many of the farmers who have been sending in inquiries for information and assistance (regarding the growing of drugs rather than corn and potatoes) were to grow reasonable crops, wide over-production would result. The grower would stand to lose heavily, would not again attempt the job, and we'd be right back where we are today."

In short, officials of the drug industry—to whom you would have to sell your product if you followed Dr. Albers' example and went into drug farming on a large scale—insist that less than 100 farmers could supply America with all the drugs it needs, and they urge all agriculturists to contact them before going ahead with their planting. There *is* a field for growing drugs, in other words, but it must be rigidly supervised and restricted.

A. F. Sievers, Senior Biochemist of the Bureau of Plant Industry of the Department of Agriculture, echoes this sentiment, saying: "This history of commercial medicinal-plant culture in this country, so far as such culture has been attempted, demonstrates very clearly that at normal price levels very few, if any, of the plants now imported would be reasonably profitable. When the imports of such plants are interfered with and prices increase greatly (as at present), there is some opportunity in this field, but the prospective grower must realize that, in the case of most of these plants, his opportunity to grow them with some profit will cease soon after normal trade conditions are restored."

Dr. Sievers has, however, made a thorough study of the problem and probably knows about as much as anyone regarding your chances in the drug growing field. For practical purposes, he divides the plants that are adaptable to this country into three general groups. These are the annuals and perennials which provide a crop within the first growing season; the biennials, which do not produce until the second year, and, finally, those that require several years to produce a crop. From the grower's standpoint, those of the first group are the most desirable, of course, and those of the third group the most impractical.

Among the medicinals most urgently needed today, the Department of Agriculture mentions belladonna and henbane. These can be grown most readily in the Northern and Western States and have a high market value under present conditions. Digitalis is sometimes included with belladonna and henbane, but it grows most freely in the Pacific Northwest, where large supplies may be obtained as needed from plants which grow wild.

Of the savory herbs, the Department of Agriculture lists sage as the one offering the greatest opportunity to farmers, for the simple reason that American-grown sage usually is of better quality

than the imported article and the price, under present conditions, is highly attractive. Caraway, fennel, anise and coriander—which you'll remember was one of the products grown by Dr. Albers—also are listed as affording some opportunity for home growth, but the farmers are reminded that, while these so-called aromatic seeds present no great difficulties in their culture, they probably would not be profitable at normal market values.

As regards atmospheric conditions in various sections of the country, the Department has compiled a history of drugs which have been produced at various times in different sections, which, if it does nothing else, proves that it can be done.

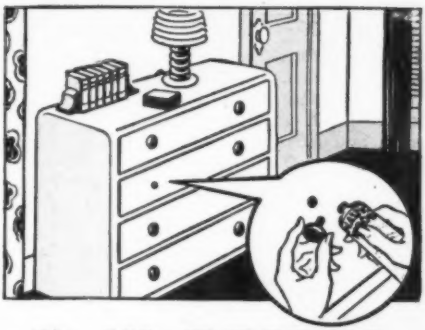
Ginseng and goldenseal root, for example, have been produced along the Pacific Coast, and the record shows that there still are scattered farms raising these plants in that area. Peppermint has been grown in Southwestern Michigan, Northern Indiana, in certain parts of New York and in Oregon and Washington, which latter states now produce most of the domestic crop. American wormseed oil was grown for almost a hundred years in Central Maryland, leading to the belief that it couldn't be grown elsewhere, though recent experiments have produced satisfactory crops in South Dakota and Illinois.

Wormwood, one of the numerous crops given trials during the first World War, has been grown successfully in Wisconsin. Sage has been produced in Michigan, Wisconsin and Texas. Burdock, wormwood, spearmint, sage and belladonna were grown experimentally in Wisconsin during the early days of World War I, but were abandoned when hostilities ceased. Also, at that time, henbane, digitalis and cannabis were grown in Minnesota, Michigan, Indiana, Pennsylvania and New Jersey, with digitalis being the only one to survive the signing of the peace treaty.

In 1916, a drug farm was started near Richmond, Va., on which were grown digitalis, cannabis, belladonna and stramonium, as well as small plantings of catnip, wormwood, calamus and orris root. Digitalis was the only one to linger on and is still being produced.

During the period of 1913 to 1919, cannabis was grown for the drug trade in the vicinity of Florence, South Carolina, but its culture later was abandoned. Kansas and Oklahoma once led in the production of castor beans, but cultivation of the crop fell off and now no castor beans are produced domestically.

If you have any idea of growing drugs, the main thing is to know what you're doing before you start. Get in touch with the Department of Agriculture's Bureau of Plant Industry and they probably will be able to tell you whether or not you're off on the wrong foot. You might also contact some of the drug manufacturing firms ahead of time, too, in order to be certain there'll be a market for your crop, if and when.



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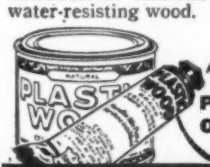

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A Ray Gun For Buck Rogers!

[*Continued from page* 69]

He moved first to a small building at Roscoe, Calif., where another attempt to steal the machine was made. He removed then to a building at Lake Elsinore, Calif. There, in spite of a burglar alarm system and locks, thieves did manage to carry away his model. Fortunately, they did not get several vital parts, which Riley had hidden.

Thereafter, Riley and his backers hired a private detective to watch the machine and guard Riley at all times. This detective, H. L. Von Wittenberg, of the Von Wittenberg Investigation Bureau, Hollywood, now is with Riley every moment of the day and the ray machine is dismantled at night and the parts are kept in various vaults.

The machine is seven feet two inches long, two feet high and two feet wide. It has two "ports" from which two parallel rays about six inches apart are shot.

Riley says that so far no material has been found which will act as a shield against the rays. The rays will pass through glass, lead, steel, or any other substance.

Riley's chief interest in the invention, aside from its possible military use, lies in his belief that it can be utilized for the wireless transmission of electrical energy. He realizes, of course, that it is exciting interest at the present time principally because of its death-dealing possibilities.

"If I were to mount it in a plane, directed earthward, and were to fly the plane low over a city, it would leave a swath of death beneath it," Riley declares. "I am convinced that it would mow down whole lines of infantry and, also, that tanks would have no defense against it, up to reasonable distances.

Recently, Riley has moved his laboratory to another location which is kept secret and is known only to the government, Riley and his bodyguard. Photographs which accompany this article were taken by Riley, himself, as he refused to lead a photographer to the place where the ray machine is now being kept.

Riley feels confident that additional research will increase the range of the machine—perhaps up to 1,000 yards.

Recently, on a trip to Washington to confer with Navy officials, a car crowded Riley's automobile off the highway near Baltimore and he was injured. He is convinced it was the work of persons who have been attempting to steal his plans.

Many "death ray" machines have been produced in the past, but none has proved successful to date. Most famous of these was one which Nikla Tesla, well known Russian scientist, claimed to have invented in 1935. Tesla's "ray" failed to stand up under tests, however.

Riley expects the Army and Navy will have completed tests on his machine within a few weeks.

Gas Pump For Spindizzies

[*Continued from page* 109]

The type shown in plan form and also in detail employs wood and metal to form the standard. If you have a lathe this is the more interesting type to construct. As the drawings show, the standard is formed of two wooden cores encased in a cylinder of light metal. The base may be weighted or screwed to a larger piece of wood for rigidity. The top core of the standard should be turned out to seat the inverted fruit jar which forms the gas supply tank. A wooden cap piece, slightly hollowed out to fit onto the top of the jar adds to the appearance as well as helping to steady the jar when it is seated on the standard. Three small rods set into the top of the standard will further steady the jar. If desired some close mesh wire gauze can be placed around the top but this is not essential. Vent and feed pipes are pushed through a large cork which fits into the jar opening and makes a gas tight joint. The cork is removed to fill the jar.

By carefully measuring the tank capacity of your car and marking off the jar container so that each mark represents one exact tank full, the utility of the gadget is greatly increased and gas is less likely to be wasted.

The all metal standard suggested in the smaller sketch is fine for those who lack lathe equipment. In this case turning is required to complete the standard and even the vent and feed tubes may be soldered to the jar cap if preferred.

Painting the finished gas pump a bright red completes the project.

Modeling With Copper Foil

[*Continued from page* 99]

nality. Suitable framing will of course enhance the value of the decorative designs. By mounting these pictures on wooden placques with copper tacks, upholstery nails, etc., very fine and rich effects are obtained. The use of cork mats fastened to backs of plywood is also desirable. Small wooden boxes, book ends and other objects can be attractively decorated with applied copper foil designs.

Australian scientists report that by applying certain concentrations of alkali they can make wool nearly unshrinkable.

First use of magnesium-thermite bombs to start fires in war was made by Italians in Ethiopia in 1936.

Kansas rates its coal reserves larger now than they were 20 years ago, because advances in strip-mining technique permit mining of coal beds so thin that they were formerly not considered commercially valuable.

Three-Dimensional Color!

[*Continued from page* 89]

processing, you have a pair of stereoscopic slides which, when examined in the viewer, will give a perfect illusion of depth.

In taking pictures by the latter method, it is necessary to select subjects which have no movement. At first glance, this might seem to put intolerable limits on picture-taking, but this is not so. Landscapes, scenes in parks, still life, architectural subjects, pictures of gardens and flowers —these are only a few of the types of photographs which may be made. In addition, very satisfactory portraits may be taken by asking the subject to remain still long enough for two pictures to be taken. The beauty of the results and the striking illusion of depth compensate for some restriction of subject matter.

Having made the slides, it is now necessary to make a viewer with which they may be looked at. The basis of this viewer is a pair of convex lenses held about three inches apart from center to center. A pair of old field glasses, with the smaller eyepiece lenses removed, will serve as an excellent basis for the viewer.

It is necessary that the pair of stereoscopic slides be held the same distance apart as the lenses and at the correct distance from them. To do this it is necessary to build a small, light-tight box around the end of the field glasses, as shown in Figure D. Any light wood will do for this, such as pieces of a cigar box. The length of the box will depend upon the focal length of the lenses. To determine this focal length, take a pair of stereoscopic slides and mount them on a piece of cardboard, approximately eight inches long and three inches wide. The slides should be mounted so that they are three inches from center to center and holes should be cut in the cardboard corresponding to the pictures on the slides. The slides may be fastened to the cardboard with Scotch tape. The picture which was taken on the left should be mounted upside down and opposite the left eye and the right hand view opposite the right eye.

Place the field glasses, with the small eyepiece lenses removed, on the edge of a table and hold the cardboard containing the slides in front of them. Move the cardboard toward the lenses and away from them until the picture, as viewed through the lenses, is sharp. Measure the distance between the lenses and the cardboard. This distance will be the basic dimension for the viewer box.

The viewer box is actually a pair of telescoping boxes, both without ends (Figure C). This permits the distance between lenses and slides to be varied to accommodate the eyes of different persons using the viewer.

The total length of these telescoping boxes should be about five inches longer than the desired distance between lenses and slides. This extra five inches allows the larger box to be attached to the end of the field glasses and also permits one box

[*Continued on page* 148]

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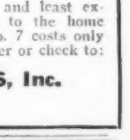

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[*Continued from page* 147]

to slip back and forth inside the other. The larger box is fastened to the end of the field glasses with semi-circular pieces of wood, cut to fit tightly and glued into place.

Once the larger box has been fastened to the field glasses the smaller one should be made ready to receive the slides. The slides may either be fastened to cardboard with Scotch tape, as previously described, or may be inserted into slots from above and dropped down into place. In the former case, provision should be made in the end of the viewer for the cardboard to slide back and forth along a groove. If the latter system is used, small slots should be built so the slides can drop down into position.

"Let the man have it, Junior. Mama will fix you a darkroom in the clothes closet."

One excellent method of holding the slides is to place them in one of the double slide carriers used by the older SVE projector. The carrier then is slid along the horizontal groove into the end of the viewer, the carrier holding the slides the correct distance apart.

When the viewer is complete it should be tested for light leaks, which can be repaired with paste and black paper. It should then be given a coat of lustreless black paint, inside and out.

In selecting scenes for stereoscopic photography, choose those which have objects in the foreground, middle distance and in the background. This gives the illusion of depth an opportunity to make itself felt. Stereo perspective in color is a sensation you'll never forget!

Some insects have as many as 25,000 tiny facets in each eye.

Small Cupola For Workshop

[*Continued from page* 111]

the air pipes at the tuyeres. When the coke charged has become well ignited, add the remainder of the coke needed to bring the coke bed up to the required height. This can be measured from the top by means of the rod which was previously prepared for this purpose.

Don't let it burn too long, or you will burn the bed coke to a mushy state, and the weight of the later coke and iron charges will lower the coke bed. In about half an hour after kindling the fire, red spots will begin to appear on the top of the coke bed. Then prepare to close the breast and make up the tap hole.

Lay an iron bar (¾ to 1 inch dia.) on the cupola bottom through the breast opening. Mix some fireclay to a putty like consistency and pack it in the breast hole against the coke and around the bar, closing the opening. When the bar is drawn out it will leave a tap hole as shown in the illustration Fig. 2. Line the spout with fireclay, joining it to the cupola bottom and the breast hole. Then turn on the blast for 2 or 3 minutes until the cupola is thoroughly heated before charging the iron. This will assure hot iron for small castings and give best results. The flame coming out of the tap hole will harden the clay in the breast and dry out the spout lining.

Coke and iron are charged into the cupola in the ratio of 8 to 10 pounds of iron to 1 pound of coke. For this small cupola, 40 pounds of iron will be about right. Select only the finer grades of iron scrap such as old automobile cylinders, machinery parts, unburnt stove-plate scrap, etc., broken up very small. The iron should be placed mostly toward the center. Then charge from 5 to 6 pounds of coke. The coke and iron should form distinct layers. There should be no bridging of iron from one layer of iron to the other through the coke. Charge as much iron and coke in alternate layers as required, or if for a long run, fill the cupola. In about 7 minutes molten iron will trickle down through the coke bed and will appear at the tap hole. It is then time to "bott-up" or close the tap hole. This is done with the bott-stick, Fig. 4. A lump of fire clay is placed on the end of the bott stick. It is then brought into the tap hole at an angle from above to avoid splashing of the hot metal.

The crucible, or that portion of the cupola between the bottom and the tuyeres will hold from 35 to 40 pounds of metal and fills every 6 or 7 minutes. It must then be drawn off so that it does not overflow at the tuyeres and into the windpipe. Experience will teach you how long it takes to fill your cupola crucible, and just when to tap it. The tap hole is opened with the pointed tool, Fig. 4, which is used as a pick to dig out the hardened clay.

The ladle should be ready at the spout, when the cupola is tapped. It would be well to pour the first tapping in a sand bed as the first run is

[*Continued on page* 150]

Steamboat Bill Rides Again

[*Continued from page 73*]

racing and young love. The *Gordon C. Greene* is typical of the modern passenger packets. She plys regularly, during the summer months, between Cincinnati, Louisville, St. Louis and the other river ports with longer cruises running as far south as New Orleans. A typical cruise might sound like this:

Leave Cincinnati, on the Ohio, at 5 p. m. on Saturday. Dinner Saturday evening is followed by lolling about on deck and drinking in the romance of it all. After dark, the tables are cleared out of the dining salon and the dance band goes into action, while non-dancers may amuse themselves playing the slot machines, listening to the chorus of Negro waiters and cooks, or sitting in on some of the captain's stories of the more adventurous days on the river.

Sunday, the steamer reaches Louisville, where the passengers may go ashore and see the sights until sailing time at 10 a. m. During the day, there is shuffleboard, a chance to prowl around the hot engine room or climb to the bridge, opportunities to moon over the endless turning of the paddle wheel at the stern, or an afternoon of just plain loafing. Bingo and horseracing are Sunday afternoon and evening features, with the dance band once again functioning in the dining salon.

On Monday morning, you're back in Cincinnati, unless, of course, you've taken a boat that goes on something longer than a weekend cruise. In the latter case, one day is much like another, except for the different sights to be seen in each of the cities reached by the steamer, the chance to pick out landmarks along shore, or the opportunity of keeping abreast of traffic conditions along the river.

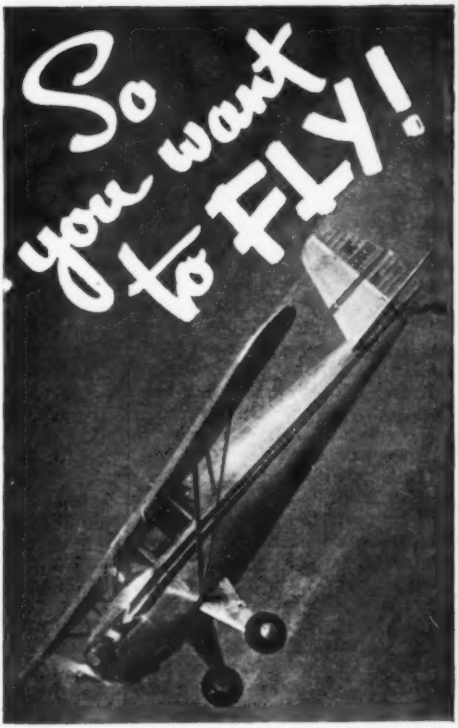
In short, it's just a chance to sail somewhere and be able to tell the neighbors you've churned up and down The Mighty River on a paddlewheeler. And, if your imagination is good, you can come home telling them about the gamblers you saw, the parasoled ladies of the old South with whom you hob-nobbed, and the descendants of Tom Sawyer who greeted you on the dock at Hannibal.

Best of all, of course, is the fact that you can tell them something that's anything *but* imagination—that the old days on the river are back with us—and greater than ever!

It may not be popular, but a California child specialist has devised a sugarless but well-balanced diet, thereby hoping to discourage bacteria and causing dental decay.

A modern military airplane represents enough work to employ 30 men for a year.

A new emergency battery for starting stalled automobiles has extra voltage and extra long cables for use from a service truck.



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Krick, The Weather Merchant

[*Continued from page 67*]

A peach farmer down in Georgia, the Central New York Power Corporation, a Milwaukee beer brewer, a motion picture producer, an airline, a speculator in the Chicago Wheat Pit, a politician, a large labor employment agency, a New York department store—all these and many other diverse persons and corporations are dependent upon Dr. Krick for information worth millions of dollars to them daily.

Even football coaches rely upon Dr. Krick to help them beat Old Siwash.

Irving Krick, until a few years ago, never had any idea of being a weather wizard. His widowed mother, in San Francisco, was a music teacher.

Krick, himself, under his mother's tutelage, became something of a boy prodigy. He gave a piano concert when he was but 15 years old at Berkeley, Calif.

Music was his first love, too, at the University of California, where he was a member of the glee club. He did study physics there, but upon his graduation he still believed music would be his career and he landed a job with a San Francisco radio station. He was heard several times on a national network as a pianist.

He kicked around the country as a pianist, doing just so-so, and finally landed back in San Francisco as a music teacher, himself.

The music school wasn't burning up the world when young Krick got a letter from his brother-in-law, who had gone to M.I.T., in Boston, and got all hopped up about meteorology. His brother-in-law said, "Come on up to Boston and get into this meteorology stuff." The idea struck Krick just right. He decided to study up on his physics again before going to Boston and entered the California Institute of Technology for a preliminary course.

At Caltech he became so engrossed in a thesis they gave him to write that he forgot about Boston and stayed on in California studying for a master's degree.

The thesis, prepared after considerable original research, established a new weather theory. Previously, everyone had taken it for granted that California's famous weather came from the nearby ocean and desert as a gift from Heaven. Krick proved that this was not the case, at all. Instead, he pointed out, the "usual" California warmth came from the prevailing northeast winds blowing in over the mountain tops and suddenly descending in a "down-draft" on the mountainsides. The compression of these down-drafts heated the air, according to a known principle of physics.

The Californians were happy to learn that their wonderful weather had a scientific as well as a spiritual basis-in-fact. The thesis won Dr. Krick considerable local renown.

Caltech got a Rockefeller Foundation endowment to investigate and develop new meteoro-

[*Continued on page 151*]

Small Cupola For Workshop

[*Continued from page 148*]

usually "cold" iron, and unsuitable for small castings. Form little channels in the sand so that the iron will run into little "pigs" which can be easily broken and remelted.

In a small cupola like this one you will not be troubled with slag. However, if you wish you can throw in a few stones about the size of walnuts with the coke charges to flux the slag. Too much lime will cause a condition that attacks the lining of the cupola causing bad "burn-backs."

After the final metal has been drawn, keep on the blast, but at a reduced pressure to burn out the coke, and shut down. To clean the cupola, break out the breast hole and rake out the ashes and slag with the other waste through this opening. The breast must be made up for each run. Provision must be made, of course, for carrying off the sparks, fumes, etc., from the top of the cupola, and some sort of ventilator or chimney should be used.

Outdoor Basketball Court

[*Continued from page 103*]

2"x4" ripped in half) rabbeted frame. The bracing of 1"x4" fir is clearly shown on the plans. Waterproof glue used on all contact surfaces adds to the strength and rigidity of the mounting, but it is not absolutely essential.

A 6"x8" fir post 16' long, set in concrete, is recommended. Anything less than 6"x8" is not rigid enough, as the stresses from wind pressure and hammering of the ball on the backboard are considerable. Of course, the post may be simply set in the ground, but this will not be as rigid as when set in concrete; and it will rot more quickly. In any case, the butt of the post in the ground, or concrete, should be treated with creosote or other wood preservative, or at least well painted with an outside lead paint. The sharp corners of the post should be planed off round and sandpapered, so there will be no chance of splinters. The entire ensemble should be well painted to withstand the weather. A light gray is a pleasing color. Green also looks well, although white or a very light color should be used on the face of the backboard.

A white pine or cedar tree, about 10" in diameter after the bark is removed and a few months' seasoning, will make a satisfactory post if available. In this case, the upper part will have to be hewn square for the backboard braces. Do not use oak or other hard woods, as they rot very quickly in the ground.

The court lines may be marked off with lime, or tape and ground staples used. The dimensions given are for standard court layouts. A blacksmith can make an improvised basket to the dimensions given, but a standard basket is not expensive and is recommended.

Krick, The Weather Merchant

[*Continued from page 150*]

logical theories. They heard of experiments in air mass analysis being conducted at Bergen, Norway, and sent their most promising young student to Norway to look into it. The most promising young student was Irving Krick.

He came back to America after visiting nine European countries, fired with enthusiasm for the new method.

It is difficult to attempt to explain the science of meteorology outside a college course. However, a very simple statement of the theory of air mass analysis may be made something in the following manner:

The United States Weather Bureau, for years, has based its 24- and 48-hour predictions upon a national weather map showing "high" and "low pressure areas," wind directions and temperatures. These observations are all surface observations. The bureau has found it impossible, from such observations, to forecast the weather for a period of longer than 48 hours.

The weather bureau's method is only "skin deep." The air mass analysis method attempts to go deeper—or, more correctly speaking, higher. It holds that surface conditions are primarily the result of more basic conditions in the upper air. It has discovered that there is a great "polar air mass" and also a great "tropical air mass" in the lower stratosphere. The manner in which these two air masses "collide" in the upper atmosphere determines weather patterns on the earth's surface.

At the time of the vernal and autumnal equinoxes, the position of these cold and warm air masses tend to set a weather pattern for the following six months. There are short-term variations, but seasonal patterns tend to run true to form.

To foretell the short-term variations, followers of the air mass analysis system depend upon observations taken in the upper air by a cute little instrument known as the radio-meteorograph. This gadget is attached to a balloon and sent 15 miles up, where it automatically records such things as temperature, wind velocity and other mysterious elements and sends the record by self-contained radio to the observation station.

Upon his return from his European trip, Dr. Krick set up an air mass analysis observation post at California Institute of Technology and started making experimental long-term forecasts.

In the fall of 1936, he really got his first break. In November of that year, he announced that the following January would bring an extremely hard freeze to the fruit-growing section of California.

The weather bureau gave him the merry ha-ha-ha, the newspapers took it up, and for a couple of months he was submitted to a nice piece of ribbing in the public prints. Such a thing as forecasting the weather two months ahead of time was not only ridiculous, but fantastic, they

[*Continued on page 152*]

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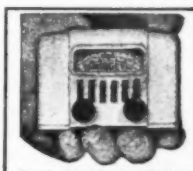

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Krick, The Weather Merchant

[*Continued from page* 151]

said. Dr. Krick retained his equanimity, though, and proceeded to foretell not only the exact date and hour on which the freeze would occur, but also the exact districts where it would strike and the exact minimum temperature which would be registered.

The freeze came.

As a matter of fact it was the worst disaster the California fruit growers have experienced in a decade. It resulted in millions of dollars of damage—most of which could have been avoided had the citrus men taken Dr. Krick seriously and prepared for the weather emergency.

Thereafter, Dr. Krick's words were hearkened to. Immediately a great number of the fruit growers came to him and offered to pay him to give them a regular weather service.

Immediately, too, the rush of other business started.

The Central New York Power Corporation called up—as well as many other huge power companies. They had a complex problem. Their power came from hydro-electric dams. Their dams were water-catchers, dependent upon rainfall over a large watershed. The call upon them for power-loads depended upon many factors—principally the darkness or the coldness of the day.

Could Dr. Krick tell them, several days ahead of time, just how much rain was going to fall on their dams and just how dark the days were going to be? Dr. Krick could.

The movie people came around—a little suspiciously, to begin with. They took a tremendous risk every time they moved to location or shot an exterior. An unexpected rain could cost them thousands of dollars—and frequently did. The information they were getting from the weather bureau wasn't good enough. In the first place, a move to location had to be planned several days in advance. The U. S. Bureau made no attempt to forecast that far in the future. Could Dr. Krick do better?

Dr. Krick furnished them his service on approval for several months. To their amazement, they found his forecasts to be better than 90 per cent accurate! Now nearly all the major studios pay Dr. Krick several hundred dollars a month each for his reports.

A central North Dakota rancher wrote in. He had a huge herd of cows in Texas. Each spring, when his calf crop came along, he shipped trainloads of calves to his North Dakota range to fatten them out on the fabulously rich Dakota grama grass. But there have been dry years in central North Dakota lately. It meant disaster to him if he should ship his train loads of steer calves to the range and then be caught in a dry season when grass did not grow. Could Dr. Krick tell him whether there was going to be average, or better, rainfall in central North Dakota this

[*Continued on page* 153]

Improved Multi-Speed Drive

[*Continued from page* 114]

Delta No. 720 pulley on jack shaft, on the other end of which is a Delta No. 932 pulley to correspond with pulley in lathe headstock. The first two pulleys named could be used on any make or model of lathe; while the lathe driving pulley must of course correspond to that in headstock of lathe used, and such a pulley is always available from the lathe manufacturer.

As illustrated, the headstock spindle has 16 speeds, ranging from 350 to 3,160 r.p.m.; and by reversing the Nos. 718 and 720 pulleys on motor and jack shaft, 16 additional speeds up to 6,320 r.p.m. are provided for small, delicate work in wood and plastics, and for polishing and finishing operations in wood, plastics, or metals—and any standard make of ball-bearing lathe will readily handle such speeds, which are *not* recommended, however, for any other type of bearing.

Total cost of this improved, 32-speed drive equipment (exclusive of pulleys, which would be the same on any type of drive) was only $5.60 for pillow blocks, 20 cents for shaft, 20 cents for 2 shaft-collars, and 15 cents for locking bolt and wing-nut. Hinges and plywood for motor base were rescued from the scrap box, along with the strips of sponge rubber. Total cost, $6.15—exactly four dollars *less* than one manufacturer charges for a jack-shaft unit with plain bronze bearings!

"Skipper," Model Aeroboat

[*Continued from page* 108]

controls for his engine. For most satisfactory operation they should be arranged so that the tank can be filled, the engine choked, the needle valve and the spark adjusted, and the booster connections and the switch can be used while the hatch is in place.

Of the various propellers tried the most satisfactory was obtained by joining two commercial 12-in. semi-finished model airplane propellers (15c apiece) together with a cross-tap joint. Use plenty of cement at the joint. Cut the tips of the blades off to make the finished propeller 10-in. in diameter. Round the cut-off edges and sand the propeller to a smooth finish. It should be balanced so that it will rest in any position.

The correct balance of the model can be found only by experimenting. Try moving the batteries to different positions to change the center of gravity but keep it as low as possible at all times. Do not worry about the model capsizing for it can do so frequently without causing damage.

Blueprints for *Skipper* with formers drawn full-size are available at $1.50 postpaid. Send check or money order to FAWCETT PUBLICATIONS, INC., GREENWICH, CONN. Order by number, No. 327.

Krick, The Weather Merchant

[*Continued from page 152*]

year? With certain technical modifications, Dr. Krick could!

The coach at the University of Southern California wanted to know whether his football team was going to have a dry field when it played Oregon two weeks hence. Dr. Krick informed him that the field would be sloppy. The California team drilled for two weeks on power plays, adaptable to a wet field—and won!

A Milwaukee brewer wrote Dr. Krick. His beer sales depend to a large extent upon hot weather. If Memphis, Teen., for instance, was going to have a heat wave two weeks hence, the brewer would ship an extra stock of beer to Memphis ahead of time and cash in. Could Dr. Krick keep him informed on heat waves? Dr. Krick could, and beer flows more freely, as a result.

The market in the great Chicago wheat pit is hyper-sensitive to the weather. Rain in Nebraska sends the wheat price skidding down within half an hour after the rain starts to fall. A hot southwest wind in Montana sends the market skyrocketing in the same length of time. Smart traders bought Dr. Krick's service and knew what the weather would be in advance. And one of them pointed out that Dr. James Monroe Smith probably would still be President of Louisiana State University had he bought Dr. Krick's service. For Dr. Smith bought 2,000,000 bushels of wheat on margin and was wiped out and went to prison—when, if he had read the Krick forecast of plentiful summer rains that year, he would undoubtedly have sold wheat short, and made a fortune instead of going broke!

Telephone companies took Dr. Krick's service. Warned of a sleet storm or a cyclone several days in advance, they have repair crews on the spot and keep service going with minimum breaks.

Politicians took Dr. Krick's service. If it's going to rain on election day, they know in advance and have an extra fleet of automobiles ready to take constituents to the polls.

Duck hunters learn whether the weather is going to be right to bring down the northern flight of greenheads next week.

Dr. Krick foretold the unheard of snows and freezes that struck Georgia two winters ago. The Georgia peach growers that were wise enough to have his service saved their trees.

Perhaps the most colorful example of Krick service is the story of how Dr. Krick won the 2500-mile California to Honolulu yacht race in June, 1940. Only one bf the contestants, the Fandango, was smart enough to think of getting Dr. Krick's long-range prediction before starting on the race.

Half-way on the course to Honolulu, the rest of the yachts were becalmed. But the Fandango, following a special wind chart supplied by Dr. Krick, had gone 300 miles out of the way—and came in an easy first, with a spanking breeze

[*Continued on page 154*]

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Krick, The Weather Merchant

[*Continued from page* 153]

blowing for the full course. Disasters such as the death by freezing of a dozen Minnesota duck hunters in November, 1940, or the death of 60 in the North Dakota blizzard of last January could have been averted by long range forecasts which would have permitted the dissemination of proper warnings.

The orders, as a matter of fact, came in so fast that California Institute of Technology was swamped. They set up a commercial organization known as the Krick Industrial Weather Service, at Pasadena, Calif., and placed Dr. Krick in charge. After certain expenses are deducted by the school, Dr. Krick gets the profit. He has varied types of service for sale, ranging from a twice-weekly report which sells for $125 a year to detailed daily specialized reports which cost several hundred dollars a month.

It's a much nicer thing than the Krick music school!

The United States weather bureau was reorganized in 1933 largely on the basis of Dr. Krick's researches. Selected members of the weather bureau staff are now being sent to school at Caltech, where Dr. Krick heads the division of meteorology, and eventually the slow moving wheels of bureaucracy will adapt the huge national weather forecasting system to the new science. Within the past two years a few weather bureau stations have been using the air mass analysis system in connection with the regular government system and issuing forecasts for a week in advance.

In the meantime, Dr. Krick is ready to cross weather forecasts with Hitler any time the country needs him.

A new petroleum lubricant "desqueaks" rubber.

Phone Shuts Off Radio

[*Continued from page* 115]

spiral spring and arrange it between both disks so, when the receiver is removed, the top disk will rise and make contact complete between the set-screw and the contact strip.

It may need some trials and experimentation before this is positive, but it is essential to automatic working of the gadget. When the receiver is replaced the disk is depressed and the circuit broken.

The two binding posts should then be wired to the volume control of the radio receiver. This will differ in many sets but the fundamental principle is the same. When the circuit is closed after the telephone receiver is raised the effect must be to short the volume control to ground. This kills the signal or at least reduces it to a point where it will not interfere with conversation at the telephone.

Paint the automatic switch to suit the room furnishings. Then, with the radio going full blast it will be only necessary to raise the receiver from its cradle to shut off the volume temporarily. When the receiver is returned to the cradle the broadcast again comes on.—*L. B. Robbins.*

Motor Reversing Switch

[*Continued from page* 115]

satisfactorily, the switch may be mounted right on top of the motor for convenience. Cut a block of wood as long as the center casting of the motor, and fasten a piece of sheet-metal on each end. Loosen the end-screws, and slip the sheet-metal pieces down between the end-pieces and tighten the screws. The sheet-metal should be as thin as is practical, so as not to disturb the alignment of the bearings. Pieces from a tin can are satisfactory.

On an induction motor, you will note that it will continue to run in the same direction after starting, even though the switch be lifted, or thrown clear over. This is because just before the motor reaches its normal r.p.m., the brushes throw out, making no contact at all with the armature, and the motor continues to run by induction.—*Fred Beard.*

Quick Selection Collet Gauge

[*Continued from page* 113]

on the collet rack. It consists merely of two steel strips set at a sharp angle with each other and bolted to the side of the rack and spaced about ½" away from the side. A cardboard strip glued to the top strip is calibrated in divisions corresponding to the capacities of the collets. The stock to be worked is inserted in the V groove and moved inward until it is stopped by the steel sides. Its actual diameter and also the collet size is read directly above the point where it is stopped.

(Correct Answers to Quiz on Page 74)

1. True. Legal name is State of Rhode Island and Providence Plantations.
2. False. A plant.
3. True. Vanilla plant is an American orchid.
4. True.
5. False. A bird eats its weight in food each day.
6. False. A Roman provine in ancient Greece.
7. True. The swayback pigs of Bali.
8. True.
9. False. It appears black.
10. True. So-called in Northern U. S. and Canada.
11. False. Should be ASCAP. "ASPCA" is American Society for Prevention of Cruelty to Animals.
12. False. May be substituted for acetic acid.
13. True.
14. False. A variety of bean.
15. True.
16. False. Black rust is a stem disease of wheat.
17. False. A bat is a mammal.
18. True.
19. True. Via the North Pole.
20. True. Maurice Barrymore's true name was Herbert Blythe.
21. False. Puttees. Ruttee is the seed of licorice.
22. False. Torch. Torque is that which produces rotation or torsion.
23. False. Types of cold chisels.
24. False. A method of mapping.
25. True.

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Turned Fruit Bowl

[*Continued from page* 91]

angle, and cut slots ⅛" apart. Note slots in the one ring are sawed opposite to those in the other ring. It will be necessary to change the setting of the jig to cut the second set of slots. Now cut off the waste stock pieces and glue the slotted rings onto the smaller walnut ring, matching the slots accurately. Then assemble disc and rings with glue to form the rough bowl. Turn a piece of waste stock with a projection to fit into the turned out center section on the bottom of the bowl. Now glue this waste stock to the bottom, gluing only around the edges to facilitate cutting waste stock off later. Mount in lathe and turn bowl to shape. Sand and finish while still in the lathe.

The matching base consists of three walnut discs and two maple rings cut and turned to dimensions shown in the drawing. The decorative grooves are cut as in the upper section of the bowl. Assemble parts with glue and when dry turn off the top edge of the base, leaving a center section to fit into the bottom of the bowl. Apply finish, then assemble base and bowl with glue. Glue felt or blotting paper on the bottom of the base to avoid marring any surface on which it is used.—*Benjamin Neilsen.*

Bottled Portraits

[*Continued from page* 86]

behind the bottle and the subject will accent the illusion, making the subject seem very completely bottled.

In arranging the lighting, focus one set of lights on the bottle and another set on the subject, as illustrated. If the model is posed at the same distance from the camera lens as the bottle, the focus can be set for that distance and both images will be sharp. If, however, you wish to have the model's reflection appear smaller in the bottle, pose him at a greater distance from the camera and consult your depth of focus scale to determine the correct lens opening for getting both bottle and reflection in sharp focus.

The most suitable type of camera for this stunt would, of course, be one that permitted ground glass focusing, particularly, the reflex type. With a little imagination, you can apply this stunt to a variety of subject and object combinations, to produce many interesting effects.

National Park Service rangers have been helping to teach American soldiers cross-country skipatrolling by compass, map reading, and how to care for themselves in severe snow conditions.

Quick-frozen flowers may be in prospect, since experiments show that gladioli can be kept for several months by this method.

Table For House Plants

[*Continued from page* 123]

edges of the plywood top, which will finish very nicely if they are well sanded. The table is given three coats of clear spar varnish which results in a blond finish that looks well with the green foliage and colored flower pots.

List of Materials

No. Pieces	T		W		L	
1 —	¾"	x	13"	x	19"	Plywood
2 —	1"	x	6"	x	23"	Y. Pine
2 —	1"	x	2"	x	12"	"
2 —	1"	x	4"	x	12"	"
1 —	1"	x	4"	x	15"	"

Screws—Nickel Plated.
12 — No. 10 — 1½" long. Oval head.
6 — No. 10 — 2½" " " "
16 — No. 10 Recessed washers.

Make This Sheraton Desk

[*Continued from page* 117]

varnish, sanded lightly between coats. The final rubbing (with a felt pad) can be pumice stone and oil followed by rotten stone and oil. For a dull gloss finish use water instead of oil with the abrasive in the final rubbing.

A desk of slightly less generous proportions can be made if desired by changing the center drawer width to 20½", the back rail to 43" long, and the top to 48" long. The width of the top should then be 26" wide and the end rails between the legs will be 20". No other dimensions need be changed for this smaller desk.

Pump For Camp

[*Continued from page* 102]

trough or basin to catch the water. An idealized version is shown in the sketch and can be constructed from material to be found in almost any locality.

Drive a stake in one end of the spring with a hole bored in one side slanting up at about the pitch indicated. Then drive a second stake on the bank buth a slot sawed down the top. The shaft can be an old auto steering post, a length of pipe or even a straight piece of hardwood limb. At the top mount a small flywheel with a crank. A fairly heavy wheel will provide a steadying means of controlling the revolutions. One end of the shaft goes in the hole in the first stake and the top end rests in the slot. A strip of tin can be used to prevent the shaft from jumping out of the slot.

Wrap a length of large garden hose around the shaft as shown, tying each turn with wire or cord. The lower end should dip well below the surface of the water. Top end should be arranged to discharge into a wooden trough or suitable catch basin. Revolve the wheel slowly and the water is lifted in a steady stream up the hose to be discharged at the top end in a stream.—*L. B. R.*

Pocket Power Tool

[*Continued from page 94*]

needed. The drive shaft is a steel rod of ⅛" diameter and that part of the plastic case immediately surrounding it should be removed with a round file, by carving it away with a knife or by use of a power cutting tool as illustrated. It will be found that the unit operates with a vibrating noise, which is not an objection in the workshop. When the tool is to be used for erasing and for similar purposes where a long stroke is not required, the case may be opened and the flat armature wrapped with a single thickness of rubber tape where it contacts one leg of the core lamination. The rubber tape must be drawn out so as to be very thin, otherwise it will reduce the power in too great a degree. For most purposes, this special treatment will not be required or desirable.

Two screw holes are available in the case for attaching accessories. Most of these require short lengths of ¼" mild steel rod, each piece drilled to make a tight fit over the drive shaft of the unit. In some cases it will be desirable to add a set screw, in which case you can secure a small tap for 10c at a department store in order to thread a hole at the side. About the only additional tools required are a drill, hack saw and tin snips.

The unit has a powerful stroke of about ⅛" or better, which is sufficient for all of the accessories outlined here. One operating consideration should be mentioned: *do not force the work.* For instance when using the scroll saw accessory, guide the tool forward gently and it will cut with ease and rapidity through thin stock, but if you attempt to force the saw blade through the work it will be considerably slowed up.

Accessories

Scroll Saw. Drill the short piece of ¼" mild steel rod for a tight fit over the drive shaft. This part will hereafter be called the fitting. Make a cut with a hack saw in the opposite end and add a set screw to hold a short piece of fine-toothed scroll saw blade. Cut the blade guide from sheet brass or thin steel, notch it to guide the blade and drill a hole so that it can be screwed to the side of the plastic case. Be sure that the blade teeth face in the direction of the guide.

Scissors. Cut off the handle loops from a pair of 10c school scissors and drill an oversize hole in the stump of one to fit loosely over the unit drive shaft. File away the rivet that holds the scissors together, then rivet them to a fitting cut and shaped from sheet brass or similar material. Drill the sides so that the accessory can be screwed to the case of the unit.

Sanding Disc. Merely solder a fitting to the center of a disc cut from sheet brass. Attach a disc of sandpaper with rubber cement.

Graver. Drill a hole through the side of the fitting to accept a graver and add a set screw to

[*Continued on page 158*]

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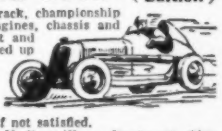

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Pocket Power Tool

[*Continued from page* 157]

hold it securely. For a graver, break a short piece from the end of an ice pick and grind it to shape. The author uses a burr (a cutting tool of hardened steel) discarded by a dentist. Grind the point to the shape required for the type of work to be done. Practice on scrap metal. Keep the graver point sharp.

Polisher and Buffer. To the fitting screw a strip of spring brass that has been bent so as to hold a sleeve made from a strip of muslin. Use with polishing compound to buff and polish plastics, metal, etc. If you wish, provide additional sleeves made up from sandpaper or emery cloth for special work.

Pencil Pointer. File a notch in the end of the fitting and in it solder a small piece of sheet brass bent to form a groove in a V-shape or trough. Line it with sandpaper.

Eraser. A 1c pencil eraser is merely slipped over the end of the fitting. Make another fitting and cut away one side to hold a typewriter eraser by means of a screw and nut.

File. Merely drill the opposite end of the fitting, thread the hole for a set screw, then drill another hole to take the shank of a small file. (It is best to break the file in half and use only the part with the shank.)

Retoucher. Remove the propel mechanism from an old mechanical pencil and attach it to the fitting with a set screw or by friction. The propel mechanism will also hold needle points.

Glass Engraver. Drill a hole in the fitting to accept the shank of a mounted silicon carbide wheel. Use a set screw. The fittings outlined for retouching, filing, etc., will also hold the glass engraving wheel.

Glass Grinder. This is merely a strip of spring brass screwed to a fitting. Use it with an abrasive paste (valve grinding compound or carborundum powder) for grinding, cutting and smoothing the edges of glass. Shapes can be cut from glass by constant application of this tool and replenishing of the abrasive.

Close-ups By Reflection!

[*Continued from page* 85]

distance between you. In shooting with a mirror, the focusing scale of the camera must always be set for the sum of the distances from the camera to the mirror and from the mirror to the subject.

Other subjects than the girl friend also lend themselves to this treatment. You can use it whenever space is cramped or distortion due to foreshortening threatens.

The United States produces more leather than any other country.

Castor beanstalks rival the fairy tale of Jack's beanstalk by growing to 30 feet in one season.

Steam-Bending Boat Frames

[*Continued from page* 125]

set up and parts for their making are of so little value they can be discarded when the boat is completed.

Figure 5, however, shows a more pretentious outfit; one suitable for steaming large frames and other members of the construction requiring bending such as coamings and rails. If you have the building of several boats in mind, or are going to tackle a fairly large one you will find the trouble and slight expense of building this steam box well worth while.

An old fifty-gallon oil drum is the boiler, simply raised up on a brick, concrete or earth foundation so the fire built beneath will have a good draft with little of its heat escaping. The side fill hole should be uppermost so water can be poured in, but as a safety measure do not use the regular screw cap here. Instead, have a loosely fitting wood plug which can be easily pulled out for refilling as well as act as a safety valve by blowing out if too great steam pressure is attained. Perhaps the end hole in your drum will come just right; it should be well up toward the top so steam, not water will come out when the hose connecting the boiler to the steam box is attached. If it does not, punch a hole to take a 1-inch pipe nipple driven a tight fit into it.

Make the box large enough to take your longest piece; it may be shallow and wide as shown or long and narrow according to the size of pieces to be steamed. While it need not be watertight it should be well put together to prevent excessive loss of steam and a cover planned which will permit getting out the particular piece wanted, and putting in others, without allowing too much heat or steam to escape. A single piece of waterproof plywood might be used, or it might better be cut in three sections and fastened together with hinges or even canvas over the joints so merely one end need be lifted. At other times a few weights will hold the cover in place.

The amount of work necessary in building any round-bilged boat is determined largely by the preparation of the frames for bending and the getting of them in. Until you have worked with correctly steamed oak and have found how easily the frames can be forced into place and fastened there you have not enjoyed to the fullest extent the pleasure of building your own boat.

Huge "defrosters" are being installed at Grand Coulee Dam to prevent ice from freezing tight the gates that control the Columbia River's flow over the dam.

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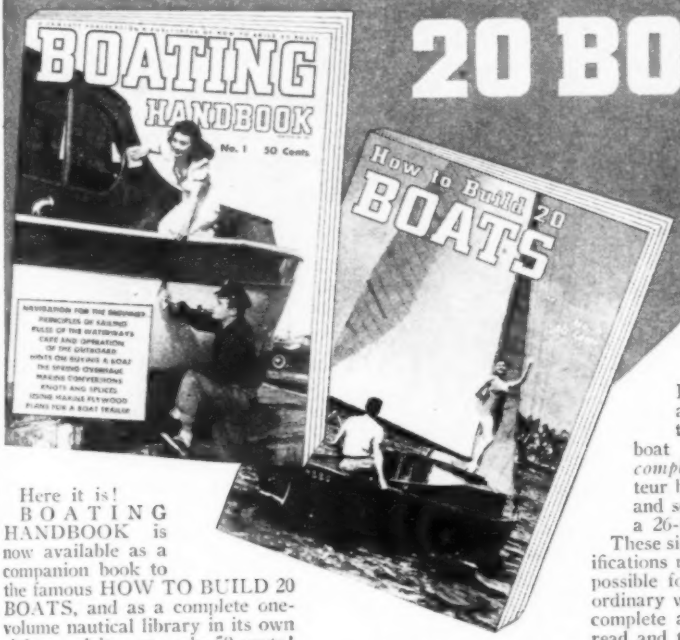

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Rustic Cedar Lamps

[*Continued from page 97*]

was used so that either one or two bulbs may be lighted. These fixtures may be obtained from any electrical supply store and are fastened to the stem of the lamp with only two screws. Any double socket will support all standard lamp shades.

After selecting the limb or knot, it may be trimmed something on the lines of the photo. Here again individual taste or ideas may be exercised as to the amount of trimming done, being careful not to trim too closely until the base has been sawed so that the lamp will sit flat on the table. By sawing off some of the surplus limbs first, unnecessary sawing on the base is avoided.

Peel off all old bark and any undesirable wood with a knife or sharp edged tool. If a green cedar limb is used, take care to peel off only the outside scales since the first wood encountered under the bark in green cedar is pure white and the natural color is preferred. However if using a dead limb, it will be necessary to go below all the old weathered wood to bring out the natural grain of the cedar. This can be seen and more readily understood by looking at the ends of the limbs sawed off. Be careful to clean thoroughly with the knife all the deep crevices and cracks of the limb until the dead bark there and other undesirable matter is removed.

After trimming as closely as possible with a knife, take the wire brush and brush heavily with the grain of the wood to clean out all dirt and dust. This is an important precaution since there are numerous small indentures in the wood incrusted with dirt.

Next, clamp the limb in a vise if one is available, if not set it flat on the floor and holding it firmly between the feet, drill a hole straight down from center of the stem out through the base to accommodate the light cord. This hole does not necessarily need to be perpendicular but care should be taken that it does not come out through the stem anywhere. In cases where the stem is very crooked, the hole may be drilled part of the way from the top, the lamp then inverted and the drilling finished from the lower side to prevent the hole coming out any place.

The limb is now ready for the varnish, but before applying, sandpaper all sawed ends to a smooth finish. In the illustrated lamp, varnish was used as a finish but a successful effect may be obtained by using either oil or shellac if preferred. Whatever is used it should be applied immediately following the sandpapering if cedar is used, since the sawed ends tend to fade and lose their rich natural color if allowed to stand any length of time. In other woods this is not necessary. Apply as many coats of finish as seems advisable.

After lamp is thoroughly dried, attach base of electric fixture to top of limb and wire in the approved manner. A shade may be bought or made depending upon one's ingenuity or the size of the pocketbook. The one illustrated was

[*Continued on page 161*]

Colorful Hostess Trays

[*Continued from page 129*]

For utility and novelty, two little wooden girls hold trays each with two gelatin mold glasses set into them. Cut the two figures from ¾-inch stock as indicated, and fasten them to a 10 by 15-inch section of ¼-inch plywood, back to back about ⅛-inch apart. Cut two trays from ½-inch stock, drill two holes in each for the gelatin mold glasses to set in, and fasten one tray to each figure with screws. The ends are cut from ½-inch stock, and sides are ¼-inch dowels glued into the end sections.

Making Keel Shoe Mould

[*Continued from page 127*]

used for full-sized castings up to several hundred pounds. Fig. 1 shows keel shoe pattern, shaped from hardwood to exact proportions of casting. Next, an open box is constructed, slightly larger than the pattern. The latter is cut down the center and a piece of cardboard inserted in the cut. Pattern and cardboard are then placed in the box and plaster of Paris is poured around them. When the plaster has set the box is pried apart and the mould which has been formed will come out in two halves, divided by the cardboard. Remove the pattern core, and reassemble the mould in the box. When all is thoroughly dry, the lead may be poured.—*A. R. Brown.*

Folding Cockpit Seats

[*Continued from page 127*]

plywood and fastened together with 2" cabinet hinges. The two hooks on the under side of the seat which engage the half-round molding on the edge of the cockpit are made as shown and the corners are rounded off with a file to avoid marring the cockpit paint job. The two bottom strips of 1"x2" pine raise the seat slightly above the deck level and aid in keeping it dry on a wet deck. A length of sash cord holds the back in position. Both ends of the cord are threaded through the holes in the seat and back and finished off with a knot. When the seat is folded for stowage the knotted ends are pulled through and tied together. —*R. A. H.*

Make Your Campfire Safe

[*Continued from page 101*]

uniform heat, which will do a fine piece of baking.

Fire-irons are a great help about the camp fire. A piece of ⅜-inch round iron, 4 feet long, may be bent at right angles 12 inches from each end and the ends sharpened. Two of these are placed side by side, the ends driven into the ground and the fire kindled underneath. If you wish, instead of being made of one piece, the pegs and crossbars may be connected by rings in the ends. These fold up and are very easy to carry.

Rustic Cedar Lamps

[*Continued from page 160*]

produced by a shop famous for Western shades.

These lamps may be successfully used on dude ranches, in mountain lodges, summer camps, a den or study, for the room at college or in fact any place where an unusual and attractive lamp is required. They make ideal gifts or can be used as souvenirs from the part of country where the wood was obtained.—*Milton C. White.*

Wagon Wheel Light Fixtures

[*Continued from page 96*]

wood a little. After the wood has been thoroughly sanded, smooth off with steel wool. (Most carriage wheels are made of Ash, which will finish up very easily.) After all dust from the sanding has been wiped off, apply boiled hot linseed oil. Daub it on with a stick having a soft rag tied on one end. After the wheel has been thoroughly covered, wipe it with a clean cloth. This will leave a soft, dull finish which brings out the true grain and finish of the wood. Paint the rim and hub with dark shellac and the fixture is ready for wiring and hanging. Connect the sockets with brass running-thread pipe through the ⅜″ holes, and fit pipe nuts over the top. (Fig. 2) The running-thread pipe is cut down to 1½″ in length. Wire as shown in Fig. 1 but be sure to connect each wire to the same terminal as was connected to the preceding one. Fasten ½″ eye-screws to the top side of the rim 27½″ part, and 1″ eye-screws to the ceiling joists. Put them through washers so that when they are tightened up they will not mar the ceiling board. Measure the brass chain and cut it down in length so it will make the fixture hang from six to eight inches from the ceiling.

Two wire leads from the fixture hook-up to the plug should have a little extra length so in case repair would have to be made on the fixture, two eye-screw connections can be loosened and will swing down as shown in illustration.

List of Materials

1—40″ carriage wheel
8—⅛″x1⅛″ brass running-thread pipe
8—25 watt light bulbs
Old light fixture chains (brass)
8—Sockets (no shut offs)
4—1″ eye screws
4—Washers for 1″ eye screws
4—½″ eye screws
12′ of insulated wire
Wiring staples
1—plug, sandpaper, steel wool, linseed oil, shellac

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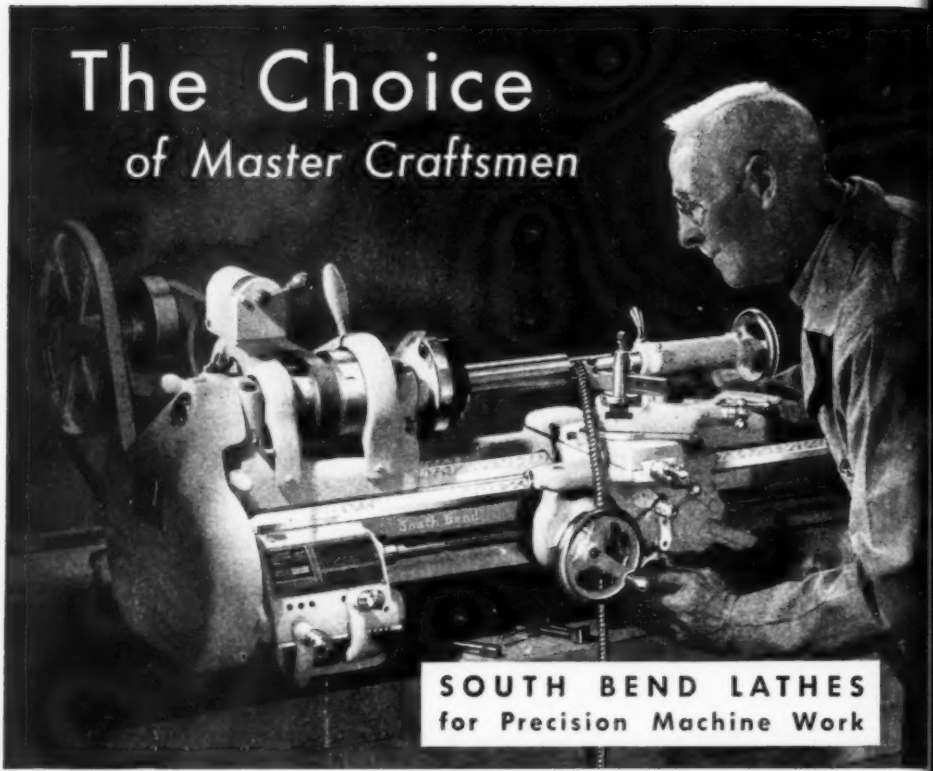

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